TOOELE ARMY DEPOT

Tooele, Utah

Monitoring Well C-47F Completion Report Phase II RFI Groundwater Investigation

Contract Number: GS-10F-0179J

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PARSONS

KLEINFELDER

Prepared by:

PARSONS and KLEINFELDER

Salt Lake City, Utah

MONITORING WELL C-47F COMPLETION REPORT
PHASE II RFI GROUNDWATER INVESTIGATION
TOOELE ARMY DEPOT
TOOELE, UTAH

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ABBREVIATIONS AND ACRONYMS

µg/L ..... micrograms per liter
ASTM ..... American Society for Testing Materials
bgs ..... below ground surface
BRAC ..... Base Realignment and Closure
btoc ..... below top of casing
CTC ..... carbon tetrachloride
EPA ..... Environmental Protection Agency
gpm ..... gallon per minute
IWL ..... Industrial Wastewater Lagoon
MCL ..... maximum contaminant limit
NAD ..... North American Datum
NEB ..... Northeastern Boundary Plume
NGVD ..... National Geodetic Vertical Datum
NTU ..... nephelometric turbidity unit
NPL ..... National Priorities List
PCE ..... tetrachloroethylene
PDB ..... passive diffusion bag
PID ..... photoionization detector
ppm ..... parts per million
PVC ..... polyvinyl chloride
RCRA ..... Resource Conservation and Recovery Act
RFI ..... RCRA Facility Investigation
STL ..... Severn Trent Laboratories
SWMU ..... Solid Waste Management Unit
TCE ..... trichloroethene
TEAD ..... Tooele Army Depot
UAC ..... Utah Administrative Code
UID ..... Utah Industrial Depot
USACE ..... United States Army Corps of Engineers
USCS ..... Unified Soil Classification System
VOA ..... volatile organic analysis
VOC ..... volatile organic compound

1. INTRODUCTION

This report contains detailed information regarding the drilling, construction, development, and sampling of groundwater monitoring well C-47F, located within the Base Realignment and Closure (BRAC) parcel on Tooele Army Depot, Utah (TEAD). This report was prepared for the US Army Corps of Engineers (USACE), Sacramento District, under Contract GS-10F-0179J, on behalf of TEAD by Kleinfelder, Inc., (Kleinfelder) and Parsons in Salt Lake City, Utah.

TEAD is an active military facility located approximately 35 miles southwest of Salt Lake City, Utah (Figure 1.1) and it has been in operation since 1942. TEAD has been a primary storage, maintenance, and disposal facility for conventional munitions since its inception. Due to impacts to groundwater quality resulting from this activity, TEAD was added to the National Priorities List (NPL) under the federal Superfund program in October 1990.

1.1 BACKGROUND INFORMATION

Historical wastewater discharged to the unlined Industrial Wastewater Lagoon (IWL) at TEAD resulted in a large impacted groundwater plume beneath the eastern portion of the Depot. A large number of monitoring wells, piezometers, extraction wells, and injection wells have defined a trichloroethene (TCE) plume along downgradient, northern, and western extremes of the Depot. This occurrence of impacted groundwater was designated the Main Plume.

In 1986, TCE was detected in an off-site production well located north of the Industrial Area, approximately 5,000 feet (ft) northeast of the IWL. In 1994, well C-10 was installed at the northeastern boundary of the Depot. TCE was detected at a concentration of approximately 240 micrograms per liter (µg/L) in groundwater sampled from well C-10, located directly across the road from the impacted off-site production well (Kleinfelder, 1998).

Additional groundwater investigations were conducted to further assess the nature and extent of groundwater contamination at the northeastern boundary of TEAD. These additional investigations indicated that the contamination in well C-10 and the adjacent off-site production well had likely originated from a source different from that attributed to the Main TCE plume. Thus, two plumes of groundwater contamination were indicated. This second, more easterly plume, was designated the Northeastern Boundary (NEB) Plume. The oil-water separator at Building 679 in the former industrial area (now the privately owned Utah Industrial Depot [UID]) was identified as a major source of this plume (Kleinfelder, 2002).

A subsequent investigation was designed to define the approximate off-site extent of the NEB Plume. The plume, which is relatively narrow beneath the former industrial area, extends

approximately 16,000 ft downgradient (to the north) from the identified source at Building 679 (Parsons, 2003a). The installation of groundwater monitoring well C-47F was conducted in accordance with the Phase II Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) Solid Waste Management Unit (SWMU) 58 Work Plan (Parsons, 2003b) and Work Plan Sampling and Analysis Plan Addendum 1 (Parsons, 2004) that were approved by the US Army and the State of Utah prior to initiating fieldwork.

1.2 PROJECT PURPOSE AND SCOPE

Monitoring well C-47F is one of fifteen groundwater monitoring wells installed between September 2004 and September 2005 during the Phase II RFI at SWMU 58. SWMU 58 encompasses the source area and the area impacted by the Main and NEB TCE Plumes. Objectives of the groundwater investigative component of the Phase II RFI are to:

- Refine the vertical limits and lateral extent of the Main and NEB chlorinated solvent plumes;
- Further characterize the distribution of contaminants within the plumes;
- Ascertain whether there are additional contaminant sources to the NEB Plume and assess their impacts to groundwater;
- Assess the risks to human health associated with the unmanaged (off-site) portion of the NEB Plume; and
- Refine the existing numerical groundwater flow and solute transport models with respect to fate and transport, in order to better predict the potential extent (stability) of the plume in the future.

Investigative efforts described in this completion report were supervised by a Kleinfelder State of Utah-registered geologist who was present for critical on-site activities. Before drilling began, a permit for well construction was obtained from the State of Utah Division of Water Rights. Copies of the Request and Authorization letters and the Driller's Start Card are included in Appendix A. Underground utility clearance was obtained through Blue Stakes Location Center and UID.

Monitoring well C-47F was drilled, constructed, developed, and sampled between August 5 and October 11, 2005. Drilling and construction activities were conducted by Layne Geoconstruction (Layne) of Salt Lake City, Utah. Following completion of the well, Layne submitted a Well Driller's Report, which is included in Appendix A. Well development and groundwater sampling were completed by Veolia Water North American Operating Services, LLC (Veolia Water), which operates the groundwater treatment plant at TEAD. Laboratory analyses were provided by Severn Trent Laboratories (STL) of West Sacramento, California, which is a State of Utah and

USACE-certified analytical laboratory. Down-hole geophysical logging was performed by RAS, Inc. (RAS) of Golden, Colorado.

Monitoring well C-47F is located in the SW ¼ of Section 30, T3S, R4W, Salt Lake Base and Meridian within the BRAC parcel at the north end of the UID. The well was installed along the northwest side of Building 615, within about 20 ft of the former degreaser location inside of the building (Figure 1.2). Although the former presence of the degreaser fueled suspicions that groundwater might be impacted at this location, soil gas analytical data from proximal deep soil boring I610-VPB003 strongly supported this hypothesis.

C-47F was installed at this location for two reasons: 1) to determine if the regional valley fill aquifer was impacted by chlorinated solvent contamination owing to the degreasing activities that occurred within Building 615, and particularly at the degreaser, over a period of 30+ years; and 2) obtain groundwater elevation data so that the hydraulic gradient and the groundwater flow direction in this part of the former industrial area could be refined.

2. DRILLING, SAMPLING, AND LOGGING METHODS

2.1 DRILLING

Groundwater monitoring well C-47F was drilled by Layne Geoconstruction of Salt Lake City, Utah, between August 5 and August 9, 2005 using a Becker AP-1000 percussion hammer drilling rig manufactured by Drill Systems. The AP-1000 advances a dual-walled 10-inch diameter drill pipe into the subsurface by means of a diesel-powered pile hammer. Circulating air is pumped down the space between the inner and outer walls of the drill rod to the drill bit, where formation cuttings are picked up and carried back through the center of the drill rod and out of the borehole as the air returns to the ground surface. Cuttings are separated from the discharging air by a cyclone. Dry cuttings were collected and spread on the ground around the well site, whereas saturated cuttings were contained in 55-gallon drums pending analytical results.

2.2 SAMPLING OF DRILL CUTTINGS

Cuttings were observed continuously as they discharged from the cyclone and were collected in 1-quart bags and chip trays. The cuttings were collected and logged at 5-foot intervals or when significant changes in lithology occurred. Drive sampling in previous boreholes during this program was rarely successful due to refusal in coarse sediments and inability to predict where thin, fine-grained layers would occur. Thus, a more accurate and complete borehole log resulted from continuous observation of cuttings from the cyclone.

Drill cuttings were logged using the American Society for Testing Materials (ASTM) Method D2488-00. The Unified Soil Classification System (USCS) was used for designating the various types of unconsolidated material encountered. Where a conflict between the two methods was identified, the ASTM convention took precedence. Color of the drill cuttings (when wetted) was noted by referencing the Munsell color chart system. Estimated percentages of gravel, sands, and fines; degree of roundness and lithology/mineralogy of any gravel clasts; moisture content; degree of cementation; and any other notable attributes were routinely recorded in the sample description. The Becker Hammer Drilling method allows for a maximum clast size of about 6 inches to pass through the drill pipe to the surface. While boulders and cobbles exceeding this dimension may occur over certain intervals, their percentages cannot be estimated.

Grab samples of drill cuttings were logged and screened for volatile organic compounds (VOCs) using an Environmental Instruments photoionization detector (PID). PID readings were also included on the boring log. PID readings from the grab samples from this boring ranged from 0.0 to 4.5 parts per million (ppm). A composite of these samples was submitted for VOC analysis, which was used to determine the proper means of disposal for cuttings from this borehole. Drill

cuttings were containerized in a roll-off bin, which was transported to the UID 90-day yard following completion of the boring pending analysis of the IRW characterization sample.

2.3 RECORD KEEPING

While on site, Kleinfelder's geologist maintained records of all activities in a bound field log book, on Daily Field Report forms, Drill Rig Inspection forms, Safety Meeting Forms, and Equipment Calibration Logs. Copies of these records are presented in Appendix B.

3. SUMMARY OF SUBSURFACE CONDITIONS

3.1 GEOLOGIC LOG

A Kleinfelder geologist was on-site during drilling and sediment sampling in order to maintain a continuous geologic log of the subsurface conditions that were encountered. Lithologic descriptions and the geologist's observations were entered onto the geologic log. The geologic log of the cuttings that were sampled during drilling of monitoring well C-47F borehole is included in Appendix C as Plate C-1.

The geologic log indicates that the boring was drilled in unconsolidated valley fill sediments from the ground surface to a total depth of 380 ft below ground surface (bgs). Most of the subsurface sediments encountered were poorly graded sand and gravel with varying amounts of boulders, cobbles, silt, and clay. The majority of the coarse-grained sediments consisted of sub-rounded to sub-angular clasts of quartzite and limestone that appeared water-worn. While some angular clasts were observed, these are likely products of the mechanical breaking caused by the percussion hammer drilling method. The coarser-grained sediments (i.e., gravels) are interpreted to have been deposited in a dynamic high energy depositional environment of coalescing alluvial fans. They are thought to represent one or more of several types of alluvial fan deposits, including debris flow, stream channel, sheetflood, and sieve, that have been defined (Collinson, 1978) based on depositional process, location on the fan, deposit morphology, degree of sorting and bedding, etc.

Horizons of less permeable fine-grained and/or clay-rich sediments were logged at depths of 38-42, 66-69, 86-92, 108-113, 132-134, 140-143, 160-165, 204-212, 347-351, and 378-380 ft bgs as indicated on the geologic log. As per the coarser-grained sediments, those intervals comprised of a significant percentage of silt and/or clay probably are thought to have been deposited within the distal portions of the alluvial fan, in a playa lake and/or floodplain setting (Collinson, 1978).

The geologic log also documents that numerous moderately- to strongly- caliche cemented zones were encountered, at depths of 96, 135, 143-145, 168-170, 196-198, 225-229, 290-292, 320-322, 25-327, 331, 335, 339, 348, 352, and 356-360 ft bgs. The boring was terminated before bedrock was encountered.

As previously mentioned, well C-47F was drilled 35-40 ft southwest of vertical profile boring I610-VPB003, which was subsequently converted into vertical soil gas well I610-VSG013. As one would expect, a review of the geologic logs for the two borings shows that the stratigraphy encountered in the two borings to be very similar. Nevertheless, a number of fine-grained silt- and/or clay-rich units were only found in one boring or the other. The majority of these occurrences were only 1 to 2 ft thick, but two of the intervals in well C-47 that were not identified in I610-VPB003 are each 4 ft in thickness. The limited continuity of some of these

fine-grained units suggest that they are probably stream overbank deposits, or have been subjected to localized erosion.

Free water from the cyclone was first observed at approximately 370 ft bgs during drilling. The depth to water was measured at 354.05 ft below top of casing (btoc) by Veolia Water after the well was constructed and developed. That datum represents the potentiometric surface for the regional valley fill aquifer. Although several strongly caliche-cemented zones occur between 356 and 360 ft bgs, there is no evidence that a semi-confining condition exists at this location. Also note that no perched water was encountered during drilling of monitoring well C-47F.

3.2 GEOPHYSICAL LOGS

As a secondary interpretive tool, down-hole geophysical logging of monitoring well C-47F was completed within the polyvinyl chloride (PVC) cased well following construction. Natural gamma ray (gamma) and induction electric (induction) logs were run simultaneously by RAS on September 10, 2005 using a combination gamma ray-induction tool manufactured by Century Geophysical Corporation of Tulsa, Oklahoma. The gamma and induction logs for this well are contained on Plates C-2a and C-2b in Appendix C. Data validation was attained via a repeat logging run of a selected stratigraphic interval within the well, which is also presented in Appendix C. An interpretation of the downhole gamma and induction electric logs for C-47F is also included in this appendix as a multipage log. It references the geologic units that were documented during the logging of well C-47F. The downhole geophysical logs generated in C-47F were also compared with the geology documented in nearby vertical profile boring I610-VPB003, so as to ascertain the extent of agreement between the two. This comparison is also presented in Appendix C as a multipage printout.

The gamma logging technique measures the natural gamma emissions emanating from the formation surrounding the borehole. This radiation is released from nuclei of an unstable element decaying to a more stable element. Potassium-40 is the element responsible for most of the gamma radiation detected by the gamma ray probe. This element is very abundant in a number of rock-forming minerals, such as potassium feldspar, that weather to clays. Hence, for those clays derived from the breakdown of potassium-bearing minerals, as the clay content of the sediment increases, the gamma ray response also increases. Thorium- and uranium-bearing minerals also produce a gamma ray response, but in most geologic environments, including the unconsolidated valley fill deposits at the project site, the potassium-40 isotope is most abundant. Conversely, the gamma response becomes progressively weaker as the quartz content of the sediment increases. A comparison of this and other monitor well boring logs with their respective gamma ray logs generally shows a very strong correlation between finer-grained, clay-rich units and gamma ray peaks. The measurement scale of the gamma-ray log is in API (American Petroleum Institute)

units, accepted as the international reference standard that allows consistent comparisons to be made between a wide variety of gamma-ray counting devices.

The gamma ray response for C-47F falls within a fairly narrow range, with most readings between 70 and 120 API units. The maximum reading of 190 API units was documented at about 106 ft in response to a lean clay interval. Despite identifying about 10 units that contain significant clay, only a few of them are marked by a pronounced gamma response: a lean clay at 108-122 ft bgs and one at 132-134 ft bgs. The majority of these clay-rich intervals are marked by only weakly elevated responses or no discernible peak at all. One significant peak at about 17 ft does not correspond to any clay-rich unit encountered in C-47F, but does correlate with a silt-clay unit that was logged in vertical profile boring I610-VPB003. The unit evidently pinches out before it reaches C-47F. (See remarks below concerning a comparison of the geophysical logs to the geologic log for I610-VPB003.) The absence of a more pronounced response for many of these finer-grained clay-rich zones may reflect one or more factors including clay mineralogy (e.g., a lack of potassium-bearing clay minerals such as illite).

The induction log measures the conductivity from high frequency alternating currents that are induced into the geologic formation, and is best suited where the formation is characterized by low to medium (less than 50 ohm-meters) resistivity values, the geologic medium exhibits medium to high porosity, and the open borehole was advanced using mud or air as the drilling fluid. Induction logging can be performed in boreholes cased with PVC, but not with steel pipe. Although the induction device measures conductivity, by convention, the conductivity readings are converted to a resistivity curve when plotted on a down-hole log via a simple inverse relationship.

Three curves are shown on the induction logs that were run by RAS. They represent: 1) an apparent conductivity ("ap-cond") curve designated by a dotted line (these readings have not been corrected for the temperature of the induction probe); 2) the direct conductivity (millimhos/meter) readings as designated by a dashed ("cond") curve on the plot (these readings have been corrected for the temperature of the probe); and 3) resistivity (ohm-meters) measurements derived from a conversion of the temperature-corrected conductivity readings that are depicted as a solid ("res") line on the induction log plot. Note that although the conductivity and resistivity curves appear to mimic one another, the scales for the two properties are reversed since their relationship is an inverse one.

The responses of the induction electric log for C-47F largely reflect differences in porosity, and moisture and clay content of the sediments. Resistivity readings average between about 13 and 15 ohm-meters; most of the curve is relatively flat. A number of weak to strong resistivity anomalies punctuate the curve; most of these are lows associated with clay-rich intervals within the gravels. The most pronounced resistivity low (about 6 ohm-meters) was in response to a clayey gravel unit at 7 ft. In contrast to the pronounced lows associated with clay-rich zones, the

resistivity curve is hardly affected by the numerous caliche-cemented zones encountered in the lower part of the boring.

The temperature-corrected conductivity curve fluctuates between about 60 and 150 millimhos/meter in C-47F, with background readings falling between about 60 and 75 millimhos/meter. All of the conductivity highs (~85-110 millimhos/meter) are associated with clay-rich sediments. The strongest conductivity response is associated with a clayey gravel unit at about 7 ft bgs. Like the resistivity curve, the conductivity response is very uniform over several substantial intervals consisting of well-graded gravel with sand and/or silt.

Note for C-47F, the apparent vertical offset between some geophysical anomalies and the inferred source interval interpreted to have produced the response. This relationship is a function of the percussion hammer drilling method, which typically returns the drill cuttings to the surface following a 5-foot advancement of the dual-wall drill pipe (e.g., at 100, 105, 110 ft bgs, etc.), rather than continuously, as is the case with rotary drilling methods. As a result, the depths to distinct geologic features such as contacts and cemented zones must be estimated by the field geologist. Even if the geologist is at the cyclone when the drill cuttings are returned to the surface, the depth estimate for contacts and other geologic features of note may be off by a few feet or more. Thus, where discrepancies exist between the geophysical and geologic boring logs concerning the actual depth(s) at which a distinct sediment unit or other geologic feature occurs, the geophysical log(s) will provide the best control.

Unquestionably, the induction log was most effective in identifying the clay-rich intervals within this boring, including at least one unit that was logged in nearby boring I610-VPB003 but pinches out between that borehole and C-47F. Several other unexplained induction log anomalies may be indicative of a similar stratigraphic relationship. In contrast, the gamma log by itself failed to identify the bulk of the fine-grained and/or clay-rich intervals that were described during geologic logging and confirmed by the induction log.

A comparison of the downhole gamma and induction logs generated in well C-47F with the geologic log for nearby vertical profile boring I610-VPB003 reveals good agreement between them. Some of the gamma and induction anomalies that could not be explained by the geologic boring log for C-47F do correlate with units identified in I610-VPB003. Conversely, some of the anomalies that do not correspond to any potential source units in I610-VPB003 exhibit spatial agreement with such units in C-47F. This observation reflects the discontinuous nature of many or most of the fine-grained and/or clay-rich units intersected at this site. This aspect of the basin fill stratigraphy may be true of the entire project area.

3.3 HYDROSTRATIGRAPHIC SECTION

To aid in understanding the subsurface geology and water table configuration in the vicinity of this monitoring well boring, the geologic log for this well was included on a straight line cross section trending northwest-southeast over a distance of approximately 4,860 ft that is also defined by monitoring wells C-19, C-21, C-48F, and C-49 (Plate C-4). Wells C-19 and C-21 were projected onto this section. Projection distances are provided on the cross section. The location of this cross section (E – E') is shown on Plate C-3. Note that only cross section E – E' is provided in this well completion report, since it is the only section that is partially defined by monitoring well C-47F.

No substantive effort has been made to date to correlate the numerous fine-grained and /or clay-rich units that have been logged in the four monitoring wells (C-19, C-47F, C-48F, and C-21) located in the former TEAD industrial area. It is surmised that even without the benefit of downhole induction and gamma logs for C-19 and C-21, many of the finer-grained units and possibly some caliche zones may be correlative between these four wells. A detailed review of the geologic boring logs for those four wells will be performed at a later time, and the findings will be presented in the Phase II RFI Report. Moreover, the geologic logs for nearby vertical profile borings I610-VPB003 and I610-VPB004 will also be used to refine the stratigraphic relationships in that area. Nevertheless, no attempt has been or will be made to correlate the stratigraphy between C-49 and the aforementioned wells in the former TEAD industrial area due to the large distance (3,000+ ft) between them.

A comparison of the geologic boring logs for I610-VPB003 and C-47F revealed several clay-rich units that were present in one of the two borings but not both, implying that the units either pinch out over the 35-40 ft distance between the two borings, and/or have been truncated over that distance due to erosion.

Difficulty in correlating distinct fine-grained units is to be expected, given that the unconsolidated valley fill within SWMU-58 was largely deposited in a dynamic high energy depositional environment of coalescing alluvial fans. Fine-grained units deposited under such conditions are characterized by limited thickness and areal extent, and this also appears to hold true for the project area as a whole. Other factors that challenge efforts to correlate stratigraphic units include post-depositional erosion and sediment reworking, and the inclined depositional surface of the alluvial fans. They are treated in greater detail in earlier Phase II RFI well completion reports.

Finally, the same general comments presented above for fine-grained sediment deposits also apply to correlation of caliche-cemented zones. Ultimately, the ability to correlate both fine-grained sediment units and cemented zones between monitoring wells in the project area may be contingent upon the quality of the downhole gamma and induction electric logs for those wells.

4. WELL CONSTRUCTION SUMMARY

4.1 CONSTRUCTION TECHNIQUES AND MATERIALS

During drilling of monitoring well C-47F, the 10-inch Becker Hammer drive casing was advanced to a depth of approximately 380 ft bgs. Well construction occurred on August 9 and August 10, 2005 inside the cased borehole. Three 10-foot sections of threaded, 4-inch diameter Schedule 40 PVC well screen with 0.010-inch wide slots and 35 10-foot sections of 4-inch diameter Schedule 40 PVC blank casing were assembled and lowered inside the drive casing to the bottom of the borehole. The screen extends from 349 ft to 379 ft bgs, and largely coincides with a well-graded gravel with silt and sand. (The rationale for installation of 30-foot screens is provided below.) A few ft of clayey gravel were noted at the top of the screened interval and 1 foot of silty clay with gravel at its bottom. The well was tagged at a depth of 380 ft bgs.

Silica sand (16-40) was added to the annulus between the PVC and the borehole in the interval adjacent to the well screen. To help minimize the risk of bridging and to confirm that the correct volume of sand was added, the sand was poured slowly into the annulus from the surface and continuously monitored until the top of the sand interval was approximately 3 ft above the top of the screen. The sand-pack interval was isolated from upper portions of the borehole with a 4-foot thick seal of bentonite clay pellets. The remaining annulus above the bentonite clay pellets was grouted to approximately 30 inches bgs with 30 percent solids bentonite slurry in accordance with Utah Administrative Code (UAC) R655-4-9.4.2. A well construction diagram is provided in Appendix D.

A decision was reached on July 28, 2005 to install 30-foot long screens in monitoring well C-47F (and C-48F) at Building 615, in lieu of the standard 20-foot screens, following discussions with the USACE project personnel regarding the recent water level data recorded for nearby monitoring wells. It was decided to install the screen so that 5 ft were above the current potentiometric surface, and the remaining 25 ft were submerged. This design specification would allow C-47F to serve as a water table monitoring well so that the vertical distribution of chlorinated solvents could be evaluated beginning at or just below the water table. The collection of passive diffusion bag (PDB) groundwater samples starting at the regional water table was considered imperative, given that both wells were installed in a significant source area for chlorinated solvents. An additional justification for the 30-foot screens was the continued long-term decline of the unconfined valley fill aquifer in the project area. Thus, it was thought the additional length would provide some “insurance” for long-term monitoring if that water level trend continued unabated. After a consensus was reached between USACE and Parsons on the well design, approval was obtained from the Utah Department of Environmental Quality (UDEQ) via a conference call later that same day.

4.2 SURFACE COMPLETION AND SURVEY COORDINATES

Monitoring well C-47F was built with a flush mount surface completion owing to its location in a high-traffic area. The 4-inch PVC well casing is accessed from a 12-inch circular traffic rated well vault. The top of the well casing is 0.5 ft bgs. The "F" designation in the well identifier signifies that the surface completion is flush with rather than aboveground. Concrete was used to anchor the well vault and build a 4-foot square by 18-inch thick pad around the finished well. The concrete pad was finished to slope away from the protective casing. A brass survey cap (monument) was embedded on the north side of the concrete pad. An as-built drawing of the flush mount surface completion is provided in Appendix D.

Ward Engineering Group of Salt Lake City, Utah, surveyed the well on November 30, 2005. Coordinates for the well locations are referenced to the North American Datum (NAD) 1983 Utah State Plane Central Zone and the elevation to the National Geodetic Vertical Datum (NGVD) 1929. Survey data are included in a table within Appendix D.

5. WELL DEVELOPMENT

Groundwater monitoring well C-47F was developed using swabbing, bailing, and pumping methods on August 15 and August 16, 2005. Development continued for 7 hours and 11 minutes until the turbidity of the water produced was less than five nephelometric turbidity units (NTUs). All development water was collected and contained for later disposal pending analytical results (see Section 7.3). Well development records are included in Appendix E.

5.1 SWABBING AND BAILING

Swabbing and bailing took place for approximately 2 hours and 59 minutes. Swabbing was done with a loose fitting surge block with an oversized rubber disk, slightly smaller than the inner diameter of the screen. Periodic measurements of pH, temperature, electrical conductivity, turbidity, and comments regarding the appearance of discharge water were recorded on well development records (Appendix E). Approximately 120 gallons of water were removed from well C-47F by bailing during development.

5.2 PUMPING

After swabbing and bailing the well, development was completed using an electric submersible pump. The pump was lowered to about 377 ft btoc, which is almost the bottom of the screened interval, and operated intermittently at rates ranging from 2.01 to 2.30 gallons per minute (gpm), for approximately 4 hours and 12 minutes. The referenced pumping rate was the maximum attainable for the 1-horsepower submersible Grundfos pump used and the depth to groundwater (354.05 ft btoc). During development pumping, the pump was periodically shut off, and the water in the discharge piping was allowed to back-flush (surge) into the well. Pumping and periodic back-flush surging was continued until there was no noticeable increase in the discharge water turbidity. Periodic measurements of pH, temperature, electrical conductivity, turbidity, and comments regarding the appearance of discharge water were recorded on well development records. A total of 528 gallons of groundwater were removed by development pumping. The final turbidity was measured at 2.42 NTU. Values for the other water quality parameters at the end of well development were: temperature –65.2 ^{o}F, pH – 7.82, and conductivity – 1549 µS/cm.

A drawdown-recovery test was performed during the pumping portion of the development of C-47F (Appendix E). A maximum drawdown of 0.10 ft was recorded after 1 minute of pumping at 2 gpm. Although pumping continued for another 25 minutes, no further drawdown was recorded. Recovery to the original (pre-pumping) water level took an equivalent time once the pump was shutoff. Negligible drawdown is to be expected, given the very low pumping rate, and the

location of the pump intake adjacent to a well-graded gravel with sand (GW), a sediment type that characteristically has a high hydraulic conductivity.

6. GROUNDWATER SAMPLING

6.1 SAMPLING METHODOLOGY

Monitoring well C-47F was sampled using PDB sampling techniques. PDB sampling is performed without purging and involves lowering a polypropylene bag filled with distilled water to a predetermined depth. Once in place, the water within the PDB sampler is allowed to equilibrate with the surrounding groundwater for 2 weeks. During this time, VOCs diffuse into the distilled water. The PDB sampler is then removed from the well and water is transferred into three pre-preserved 40 mL volatile organic analysis (VOA) vials.

Four PDB samplers were placed in monitoring well C-47F on September 16, 2005. One sampler was placed at a depth of 357 ft bgs (about 3 ft below the water table), one sampler was placed at a depth of 364 ft, one sampler was placed at a depth of 372 ft, and one sampler was placed at a depth of 379 ft. Four samples were deployed over the screened interval rather than the usual three due to the 30 foot screen length. The PDB samplers were scheduled to be retrieved from the well at the end of September. However, after it was determined that the samplers may have been jostled during semi-annual monitoring of groundwater levels, they were left in the well an additional 11 days to ensure equilibration. The PDB samplers were removed from the well and sampled on October 11, 2005. Groundwater samples collected from well C-47F were assigned sample numbers C-47FGW001, C-47FGW002, C-47FGW003, and C-47FGW004.

After the sample containers were filled, they were placed in an ice-chilled cooler and shipped overnight to STL, a State of Utah and USACE-certified analytical laboratory, for VOC analysis. Chain-of-custody forms were filled out and used to document the sampling dates, analytical parameters requested, and proper sample handling. Completed chain-of-custody forms and cooler receipt forms are included in Appendix F.

6.2 GROUNDWATER ANALYTICAL RESULTS

Analysis for VOCs was completed using US Environmental Protection Agency (USEPA) Method 8260B. The highest VOC detection in the groundwater from C-47F was TCE detected at the four depths, with the highest concentration (1,600 µg/L) reported at 357 ft bgs. There is a pronounced decrease in TCE concentrations (1,600 to 1,200 µg/L) with increasing sample depth. In view of the observation that virtually all of the screened interval in C-47F lies within the same unconsolidated sediment type, a well-graded gravel with sand and silt, there is no apparent stratification. Thus, it is surmised that the decrease in TCE values with increasing depth reflect the concentration gradient due to advection and hydrodynamic dispersion.

No other VOCs were reported, most likely due to the high reporting limits (RL) as a consequence of the elevated levels of TCE. However, it is assumed that one or more of the following analytes reported in well C-48F are likely present in C-47F, albeit in similar (i.e., very low) concentrations: 1,1-dichloroethene, carbon tetrachloride (CTC), chloroform, cis-1,2-dichloroethene, and 1,1-dichloroethane. The sampling results from monitoring well C-47F are summarized in Table 1. Laboratory reports summarizing the results of groundwater analysis are included in Appendix F. Also included is an analytical quality control summary describing data quality issues.

The elevated concentrations of TCE reported for the initial sampling of this well confirm that groundwater has been impacted at this site. Collectively several observations strongly imply that Building 615 is the source of the TCE found in groundwater beneath this site. Foremost is the magnitude of the TCE concentrations (> 1,000 µg/L) reported in groundwater from well C-47F, and to a lesser extent the TCE concentrations reported in groundwater from nearby but slightly upgradient well C-48F (300-360 µg/L) (Plate C-3). Second, the TCE concentration data obtained from the sampling of proximal vertical soil gas wells I610-VSG013 and I610-VSG014 imply that TCE and other VOCs have migrated through the vadose zone to groundwater. Finally, there are no suspected or known chlorinated solvent sources located hydraulically upgradient of Building 615 that released sufficient mass of TCE to account for the concentrations observed in C-47F and C-48F.

The last statement is based on knowledge of historical use/operations for those buildings located upgradient (i.e., to the southeast) of Building 615, and also on the findings of the Phase I and II RFI shallow and deep soil gas sampling. Chlorinated solvent use over a substantial period of time has been documented for a number of locations within Building 619, which is partially upgradient of Building 615. Nevertheless, the results of the passive and active shallow soil gas investigations, and continued monitoring of well C-21 (Plate C-3) do not suggest that the southwest corner of Building 619 is the source or a source for the TCE observed in groundwater for the two wells under discussion. In particular, recent (2004-2005) TCE concentrations reported for well C-21 (~70-95 µg/L) do not indicate that a significant release of TCE to the vadose zone occurred beneath that portion of Building 619 that lies between C-21 and Building 615.

Additionally, the elevated TCE concentrations obtained from C-47F, in conjunction with the soil gas results from vertical soil gas well I610-VSG013, imply that the two wells are situated very close to a major chlorinated solvent source, quite possibly the site of the former degreaser in Building 615, and/or the effluent piping and drains that conveyed the solvent waste to the storm drain at the southwest corner of the site.

Prior to sampling monitoring well C-47F the TCE concentration in shallow groundwater at that location C-47F was calculated using the Johnson-Ettinger vapor intrusion model (USEPA,

2004). The spreadsheets containing the input parameters and intermediate results for the vapor-intrusion calculation are presented in Appendix C. The result – 1,200 µg/L – compares favorably with the analytical results reported for the initial PDB sampling of C-47. Based on the similarity of the results, it is surmised that TCE in the vapor and groundwater phases is in or approaching a state of equilibrium at this location. Moreover, the reported TCE concentrations in C-47F appear to validate the input parameters selected for the model. Many of the input variables were derived based on the sampling and logging of proximal vertical soil gas well I610-VSG013.

TABLE 1

SUMMARY OF LABORATORY RESULTS

TOOELE ARMY DEPOT, UTAH

Analyte	Federal MCL (µg/L) 95 40CFR 141.11, 141.12, 141.61, & 141.62	Analytical Results (µg/L)			
Sample Number & Depth		C-47FGW001 (357 ft)	C-47FGW002 (364 ft)	C-47FGW003 (372 ft)	C-47FGW004 (379 ft)
1,1,1 Trichloroethane	200	ND	ND	ND	ND
1,1,2 Thrichloroethane	5	ND	ND	ND	ND
1,1 Dichloroethane	5	ND	ND	ND	ND
1,1 Dichloroethene		ND	ND	ND	ND
1,2 Dichloroethane	5	ND	ND	ND	ND
1,2 Dichloropropane	5	ND	ND	ND	ND
Benzene	5	ND	ND	ND	ND
Carbon tetrachloride	5	ND	ND	ND	ND
Chloroethane		ND	ND	ND	ND
Chloroform	100	ND	ND	ND	ND
cis 1,2 Dichloroethene		ND	ND	ND	ND
Ethylbenzene	700	ND	ND	ND	ND
m,p Xylene	10,000	ND	ND	ND	ND
Methylene chloride	3	ND	ND	ND	ND
Naphthalene		ND	ND	ND	ND
0 Xylene	10,000	ND	ND	ND	ND
Tetrachloroethene		ND	ND	ND	ND
Toluene	1,000	ND	ND	ND	ND
trans 1,2 Dichloroethene		ND	ND	ND	ND
Trichloroethene	5	1,600	1,500	1,500	1,200
Vinyl chloride	2	ND	ND	ND	ND

7. INSTALLATION RESTORATION WASTE

7.1 DECONTAMINATION METHODS

To help minimize the chance that non-dedicated equipment could cross-contaminate groundwater or drill cuttings at well C-47F, a rigorous decontamination program was followed. A decontamination station was constructed in the temporary UID RCRA 90-day yard (located south of Building 614) that could accommodate the drill rig, drill pipe, and other equipment as needed. Decontamination of equipment was conducted with approved water from TEAD production well WW-3 using a steam cleaner/high-pressure washer. Equipment wash and rinse water were contained in a sump within the decontamination Pad, and then pumped to a Baker tank in the UID 90-day yard where it was managed as suspect hazardous waste.

7.2 DISPOSAL OF DRILL CUTTINGS

Drill cuttings from both the unsaturated and saturated zone were directed from the cyclone into two 20-cubic yard roll-off bins (Parsons container #PARSNZ0521701 and #PARSNZ0522001). Because monitoring well C-47F was located in a known source area, all of the drill cuttings from this well were treated as suspect hazardous waste. This policy required that all cuttings be contained. Each roll-off bin was positioned adjacent to the Becker AP-1000 to allow for discharge of the cuttings and any groundwater directly from the cyclone. An IRW characterization sample of the unsaturated and saturated drill cuttings was collected every 5 ft during drilling. Upon completion of the borehole, these samples were composited to a single sample (IDW60) and submitted to the laboratory for analysis of VOCs.

Upon filling a roll-off bin or the completion of the drilling, the roll-off bin at the drill site was transported by MP Environmental to the UID 90-day yard, to await the analysis of the IRW characterization sample. Lab results indicated VOCs were not detected in the cuttings from well C-47F. Following approval by the TEAD environmental management office, the two roll-off bins were transported by MP Environmental to the UID boneyard off of Industrial Loop road where the cuttings were dumped and spread over the ground. A copy of the laboratory results for the composite IRW sample of the drill cuttings is included in Appendix G.

7.3 DISPOSAL OF WASTEWATER

Groundwater that was extracted during drilling was released from the cyclone directly into the 20-cubic yard roll-off bin. After the roll-off bin had been transported to the UID 90 yard by MP, the free-standing water in the bin was pumped into a 6,500 gallon Baker tank (Parsons container

#PARSNZ0520801) by the Layne-Christensen drillers. Rinsate water from the decontamination of the drill rig was also pumped into that Baker Tank.

Water derived from the development of well C-47F was transported from the well site to the UID temporary 90-day yard by Veolia Water using a 1,000-gallon capacity polytank mounted on a dual axle trailer, and then pumped into the same 6,500-gallon capacity Baker Tank. (Parsons container #PARSNZ0520801).

The waste streams generated from drilling, installation, and development activities associated with well C-47F were commingled with drilling, development, and equipment rinse water derived from nearby wells C-45 and C-48F. Commingling of the waste streams from these wells was justified because the characteristics of the three waste streams were thought to be very similar. For IRW management purposes it was assumed the development and drilling water from these wells would be impacted by TCE, trace amounts of CTC, and possibly chloroform.

The Baker Tank (Parsons container #PARS*NZ052080*) was closed on August 18, 2005 and sampled on August 23, 2005. The sample, IDW61, was analyzed for VOCs. The Chains-of-Custody and laboratory report for this sample are presented in Appendix H. This sample contained 48 µg/L TCE, 0.13 µg/L chloroform, 0.31 µg/L naphthalene, and 0.44 µg/L toluene. The waste stream was designated F001 and F005 hazardous due to the presence of TCE. The detection of naphthalene and toluene eliminated the TEAD Groundwater Treatment Plant (GWTP) as the preferred option for treatment/disposal, because that facility is not permitted to treat waste containing detectable amounts of naphthalene. Instead, the wastewater was transported in a 5,000-gallon tanker to Clean Harbors' Grassy Mountain disposal facility for solidification and landfilling on September 20, 2005 utilizing Clean Harbors' waste material profile #CH91899B. MP Environmental provided the tanker; the waste was shipped under hazardous waste manifest #P5013. The source(s) of the naphthalene and toluene is unknown. It is speculated that these constituents might have been derived from rinsate generated on the decontamination pad. Copies of the disposal recommendations memo and TEAD's authorization to dispose off-site can be found in Appendix H.

8. REFERENCES

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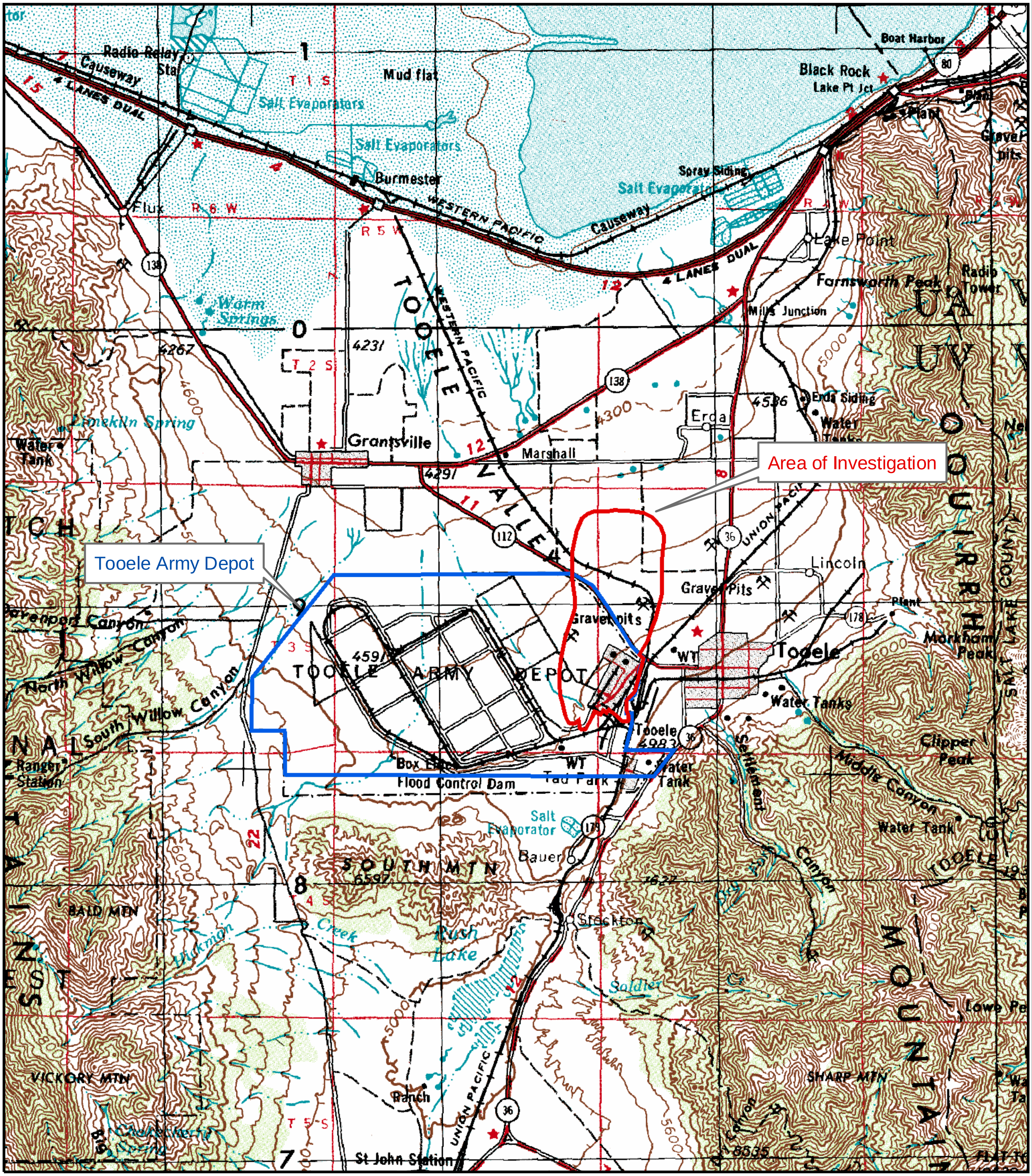
USEPA. 2004. User's Guide for the Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings (Revised). Office of Emergency Remedial Response.February *http://www.epa.gov/oswer/riskassessment/airmodel/johnson-ettinger.htm*

Welenco. 1996. Water and Environmental geophysical Well Logs: Volume 1—Technical Information and Data, 8th edition.

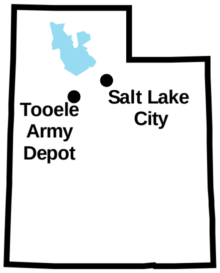


LEGEND

Installation Boundary

Investigation Boundary

Source: USGS Tooele, Utah 1 x 2 Quadrangle, 1970

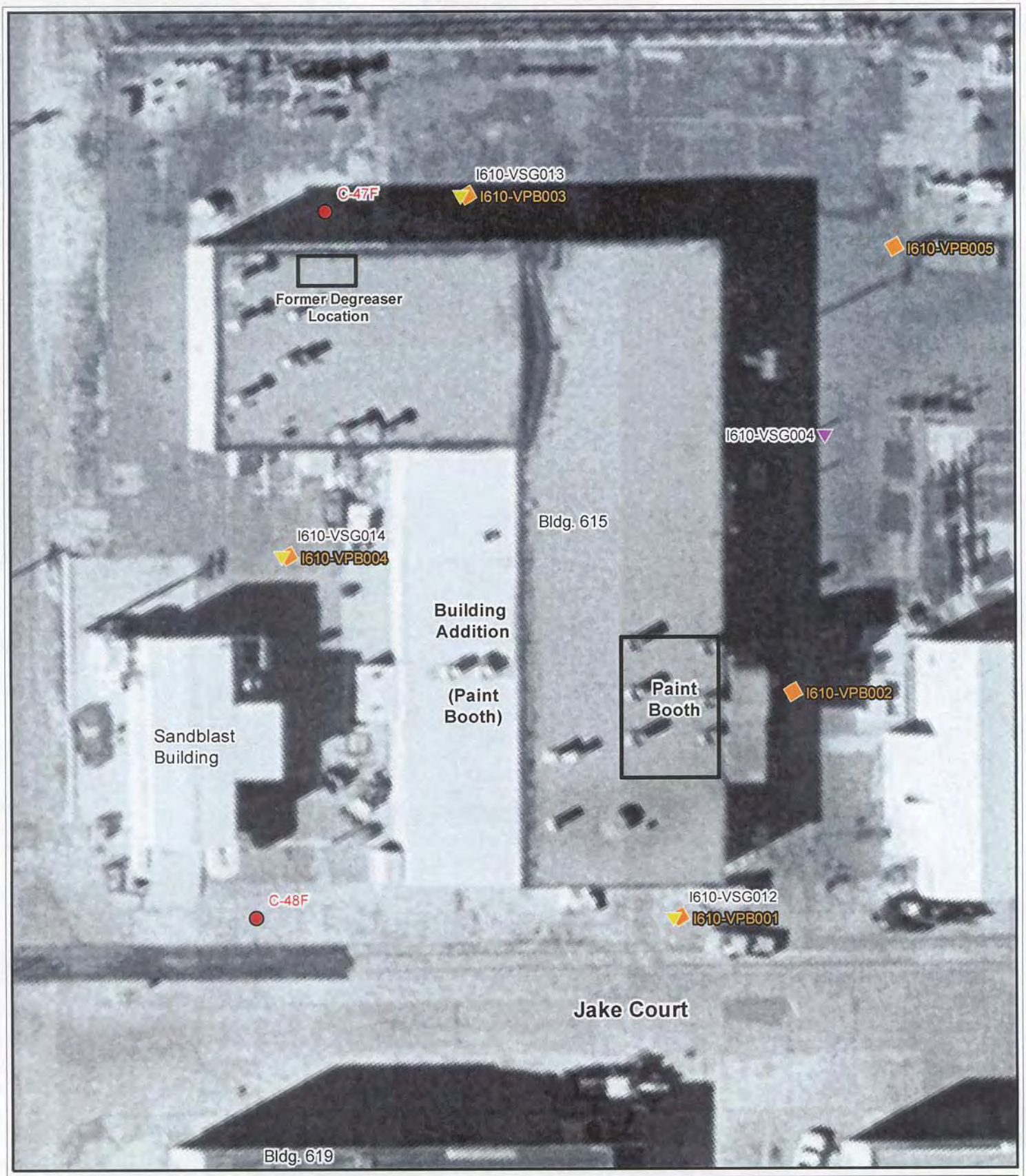


SWMU 58
PHASE II RFI
TOOELE ARMY DEPOT
TOOELE, UTAH

0 1 2 3 Miles

N

FIGURE 1.1 SITE LOCATION MAP



LEGEND

PHASE I RFI

- Vertical Soil Gas Well

PHASE II RFI

- Vertical Profile Boring
- Vertical Profile Boring Converted to Vertical Soil Gas Well
- Groundwater Monitoring Well

SWMU 58
PHASE II RFI
TOOELE ARMY DEPOT
TOOELE, UTAH

0 40 Feet

N

FIGURE 1.2
VERTICAL PROFILE BORING, VERTICAL SOIL GAS WELL, AND GROUNDWATER MONITORING WELL LOCATIONS IN THE VICINITY OF BUILDING 615

w:\tooele\maps\well_comp_report_sept2005\fig_1_2_bldg_615.mxd 2/23/06

PARSONS

APPENDIX A

UTILITY CLEARANCE FOR WELLS [redacted] C-47, 48, & 49

(208-2100)

CALLED BLUESTAKES ON WEDNESDAY, JULY 20th, 2005 AND SPOKE WITH CORY [redacted] (pH: 208-2100)

RE: UTILITY CLEARANCE FOR GW MONITORING WELLS C-47, C-48, & C-49.

MEET TIME @ 9:00AM ON FRIDAY, JULY 22nd, 2005

TICKET VALID FROM WEDNESDAY JULY 27th, 9AM TO AUGUST 3rd, 9:00AM

TICKET #

C520105**02** ISSUED FOR CLEARANCE

TORY OF THE STAKE LOCATING CENTER CLEARED TWO SITES AT BLDG 615 ON BEHALF OF QWEST & UTAH POWER, SHORTLY AFTER 9:00 AM. 2 GUYS FROM TOOELE CITY SHOWED UP FOR BLUESTAKES MEET BUT ONCE THEY FOUND OUT BOTH SITES WERE LOCATED WITHIN UID THEY LEFT, AS UID HAS RESPONSIBILITY FOR WATER & SEWER WITHIN UID.

LEE FROM QUESTAR GAS CALLED ME ABOUT 8:30 AM & SAID HE COULDN'T MAKE THE 9:00 AM MEET TIME. WE RESCHEDULED FOR LATER IN THE DAY. HE CAME BY ABOUT 11:00 AM. MARKED GAS LINE GOING FROM MOTOR TO STREET AT THE SAND BLAST BLDG AT THE CORNER OF DAVENPORT AND 3rd STREET. HOWEVER, HE IS NOT RESPONSIBLE (AND DID NOT MARK) THE GAS LINE RUNNING BETWEEN THE SAND BLAST BLDG (DIRECTLY SOUTH OF BLDG 615) AND BUILDING 615. [redacted] HE CLEARED THE ALTERNATE ON THE NW SIDE OF BUILDING 615

PARSONS

406 West South Jordan Parkway, Suite 300 • South Jordan, Utah 84095 • (801) 572-5999 • Fax (801) 572-9069 • www.parsons.com

July 11, 2005

State of Utah
Department of Natural Resources
Division of Water Rights
1594 West North Temple
Suite 220
P.O. Box 146300
Salt Lake City, Utah
84114-6300

Attn: Ross Hanson

Subject: Request for authorization to drill three groundwater monitoring wells for the Phase II RCRA Facilities Investigation at Tooele Army Depot

Dear Sir:

Parsons, on behalf of Tooele Army Depot (TEAD), requests authorization from the Division of Water Rights (DWR) to drill and install thee (3) groundwater monitoring wells within the Utah Industrial Depot northeast of TEAD and west of Tooele City (see attached table and map figure). Preparations are in progress to drill the well starting on or after July 25th and finishing by August 31st, 2005.

Each well boring will be advanced by a State of Utah licensed well driller using percussion hammer drilling to a maximum depth of about 400 ft. As per other C-series monitoring wells constructed during this program, the wells will be constructed using four (4) inch diameter Schedule 40 PVC, will extend up to approximately 40 ft below the regional water table, and a 20-ft 10- or 20-slot PVC well screen will be installed either across the regional water table or over the bottom 20 ft of the well.

If you have any questions or concerns please contact me at (801) 572-5999.

Written authorization should be mailed to Larry McFarland, SJMTE-CS-EO, 1 Tooele Army Depot (Building 8), Tooele, Utah 84074. His work phone is (435) 833-3235.

Sincerely,

Richard Jirik

Richard Jirik, R.G., P.G.
Senior Hydrogeologist
Parsons

DIVISION OF WATER RIGHTS
REQUEST FOR NON-PRODUCTION WELL CONSTRUCTION
(for wells deeper than 30 feet)

Well Type (check one): Provisional ( ) Monitor (X) Cathodic Protection ( ) Heat Exchange ( )

Applicants Name: TOOELE ARMY DEPOT

Mailing Address: SIOTE-CO-EO (BLDG 8)
TOOELE ARMY DEPOT TOOELE, UTAH 84074

Contact Person: MR. LARRY MCFARLAND Phone: (435) 833-3504

Proposed Start Date: JULY 25, 2005 Anticipated Completion Date: SEPT 30, 2005

Well Drillers License No: 215 Proposed No. of Wells: 3

PROPOSED LOCATION OF WELLS: County: TOOELE

NO./SQ. DISTANCE (feet)	EAST/WEST DISTANCE (feet)	SECTION CORNER	SECTION	TOWNSHIP	RANGE	BASE	DIAMETER (inches)	DEPTH (feet)
N1000	W1300	W4	15	2S	1W	SL	2	100

Use back of form or additional paper if more room is needed

EXPLANATORY: REFER TO ACCOMPANYING TABLE FOR INFORMATION ON THE PROPOSED WELLS.

Richard Jinick (PARSONS) FOR LARRY MCFARLAND
Signature of Applicant

JULY 12, 2005
Date

FOR OFFICE USE ONLY

Date of Request: *Approval Date:*

Approved by: *Provisional/Monitor Well No.*

Water Right Number (if available):

[redacted] ***Request for Non-Production Well*** [redacted]

C-47,48949 Cf: File-Restoration TAT 7/20 Larry McFarland

State of Utah
DEPARTMENT OF NATURAL RESOURCES
Division of Water Rights

JON M. HUNTSMAN, JR.
Governor
GARY R. HERBERT
Lieutenant Governor

MICHAEL R. STYLER
Executive Director

JERRY D. OLDS
State Engineer/Division Director

TOOELE ARMY DEPOT
SIOTE-CO-EO (BLDG 8)
TOOELE ARMY DEPOT
TOOELE UT 84074

July 15, 2005

Dear Applicant:

RE: MONITOR WELL#: 0515005M00

Reference is made to your request to drill 3 MONITOR WELL(S). The anticipated drilling depths will exceed the minumum regulated and reporting depth of 30 feet, thereby requiring permission from the Division of Water Rights to proceed with this project.

The specifications outlined in your well project request dated July 15, 2005, meet the State Engineer's requirements and permission is **HEREBY GRANTED.** Therefore, this letter is your authorization to proceed with the construction of the well(s) in accordance with those specifications and with respect to the following provisions:

1) Small diameter casing is to be used in the construction of the well(s) and no more water is to be diverted than is necessary to determine the quality of the ground water by obtaining representative samples as required by the project.

2) The well(s) must be drilled by a currently licensed Utah driller and must be drilled in a manner consistent with the recommended construction standards cited in the Utah State Administrative Rules for Well Drillers.

3) The enclosed Driller (START) Card form must be given to the licensed driller for his submittal prior to commencing well construction. The other enclosed form is the 'Applicant Card.' It is **YOUR RESPONSIBILITY** to sign and return this Applicant Card form to our office upon well completion.

4) If complete information is not available in the initial application, it is the **APPLICANT'S RESPONSIBILITY** to provide, upon completion, descriptive locations of the wells referenced by course and distance from established section corners, *e.g. North 565 feet and West 1096 feet from the SE corner of Section 35, T2S, R5W, SLB&M.*

5) At such time as the well(s) are no longer utilized to monitor ground water and the intent of the project is terminated, the well(s) must be temporarily or permanently abandoned in a manner consistent with the Administrative Rules.

NOTE: Please be aware that your permission to proceed with the drilling under this authorization expires January 15, 2005.

Sincerely,

S. Ross Hansen

Ross Hansen, P.E.
Regional Engineer

1594 West North Temple, Suite 220, PO Box 146300, Salt Lake City, UT 84114-6300
telephone (801) 538-7240 • facsimile (801) 538-7467 • *www.waterrights.utah.gov*

PARSONS

406 West South Jordan Parkway, Suite 300 • South Jordan, Utah 84095 • (801) 572-5999 • Fax (801) 572-9069 • www.parsons.com

August 12, 2005

State of Utah
Department of Natural Resources
Division of Water Rights
1594 West North Temple
Suite 220
P.O. Box 146300
Salt Lake City, Utah
84114-6300

Attn: Ross Hanson

Subject: Amended locations for groundwater monitoring wells C-47, C-48, and C-49 at the Utah Industrial Depot, Tooele, Utah (DWR monitor well # 0515005M00)

Dear Sir:

Parsons, on behalf of Tooele Army Depot (TEAD), submitted a request dated July 11, 2005 for authorization from the Division of Water Rights (DWR) to drill and install thee (3) groundwater monitoring wells within the Utah Industrial Depot northeast of TEAD and west of Tooele City (see attached table and map figure) as part of the Phase 2 RCRA Facilities Investigation at the Tooele Army Depot. The request was granted by the DWR in a letter to TEAD dated July 15, 2005. The purpose of this correspondence is provide the DWR with updated locations for all three wells currently under construction (see accompanying table and map). Monitoring well C-48 will remain within the UID, but the location of C-49 has been moved onto TEAD. Well drilling and construction specifications remain as described in our request of July 11th.

If the DWR needs to issue new start cards based on the revised locations presented here, they should be sent to Larry McFarland, SJMTE-CS-EO, 1 Tooele Army Depot (Building 8), Tooele, Utah 84074. His work phone is (435) 833-3235.

If you have any questions or concerns please contact me at (801) 572-5999.

Sincerely,

Richard Jirik

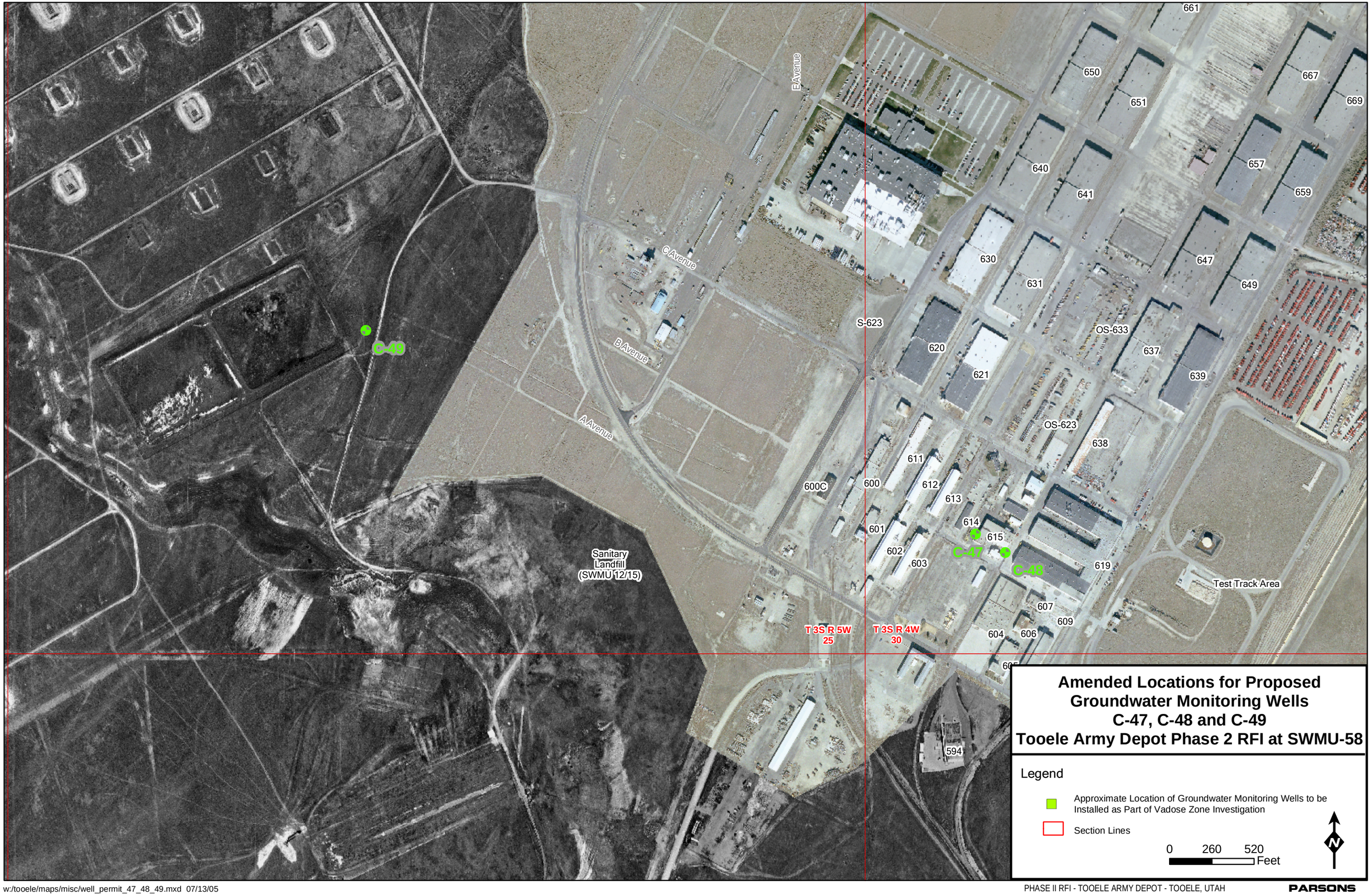
Richard Jirik, R.G., P.G.
Senior Hydrogeologist
Parsons

Cc: L. McFarland
C. Cole

REVISED LOCATION DATA FOR PROPOSED GROUNDWATER MONITORING WELLS C-47, C-48, & C-49
TOOELE ARMY DEPOT and UTAH INDUSTRIAL DEPOT
PHASE II RFI @ SWMU 58, TOOELE ARMY DEPOT

		-proposed well location-		-referenced section corner-		-well location relative to section corner-		LAT/LONG								
Well Identifier	-general location-	State Plane (northing)	State Plane (easting)	State Plane (northing)	State Plane (easting)	North/South Distance (feet)	East/West Distance (feet)	Latitude	Longitude	Section Corner	Section	Township	Range	Base	Diameter (inches)	Depth (feet)
C-47	Bldg 615 @ UID	7360557	1404815	7359821	1404137	North 740	East 670	40 31'24.79833" N	112 20'48.5677" W	SW	30	3S	4W	SL	4	370
C-48	Bldg 615 @ UID	7360446	1405000	7359821	1404137	North 624	East 850	40 31'23.70023" N	112 20'48.55407" W	SW	30	3S	4W	SL	4	340
C-49	TEAD	7361812	1401063	7359821	1404137	North 1956	West 3018	40 31'36.82295" N	112 21'39.71010" W	SW	30	3S	4W	SL	4	380

The state plane coordinates provided in this table for proposed monitoring wells C-47 and C-48 were derived from georeferenced imagery of the Utah Industrial Depot. Coordinates for proposed well C-49 were determined from a site visit to the location.



Amended Locations for Proposed Groundwater Monitoring Wells C-47, C-48 and C-49 Tooele Army Depot Phase 2 RFI at SWMU-58

Legend

- Approximate Location of Groundwater Monitoring Wells to be Installed as Part of Vadose Zone Investigation
- Section Lines

0 260 520 Feet

N

w:/tooele/maps/misc/well_permit_47_48_49.mxd 07/13/05

PHASE II RFI - TOOELE ARMY DEPOT - TOOELE, UTAH

PARSONS

APPLICANT CARD for Monitor WELL#: 0515005M00

IMPORTANT: THIS CARD MUST BE COMPLETED, SIGNED AND RETURNED BY THE WELL OWNER/APPLICANT AS SOON AS THE WELL IS DRILLED BY A LICENSED UTAH WATER WELL DRILLER.

OWNER/APPLICANT NAME: TOOELE ARMY DEPOT

MAILING ADDRESS: SIOTE-CO-EO (BLDG 8). TOOELE ARMY DEPOT. TOOELE UT 84074

PHONE NUMBER:

WELL LOCATION: You are authorized to drill 3 Monitor Wells. SEE BELOW.

WELL UTM COORDINATES:

WELL ACTIVITY: NEW (X) REPAIR ( ) REPLACE ( ) ABANDON ( )
CLEAN ( ) DEEPEN ( )

WELL COMPLETION DATE:

NAME OF DRILLING COMPANY/LICENSEE:

Larry McFarland 7-25-05

Owner/Applicant Signature Date

***COMPLETE, SIGN AND RETURN THIS PORTION UPON FINAL WELL COMPLETION - DO NOT GIVE THIS CARD TO LICENSED WELL DRILLER - YOU MUST RETURN IT.

STATE OF UTAH DIVISION OF WATER RIGHTS Phone No. 801-538-7416
Fax No. 801-538-7467

COMMENTS:

MONITOR WELL LOCATIONS:
(1) N 865 E 780 from the SW corner, S30 T 3S R 4W SLBM
(2) N 4134 E 3159 from the SW corner, S30 T 3S R 4W SLBM
(3) N 2047 W 455 from the SE corner, S25 T 3S R 5W SLBM

START/APPLICANT CARD INSTRUCTIONS: First, for each well, you must give a Driller (Start) Card to the licensed driller with whom you contract to construct the well. Second, it is your responsibility to sign and return this Applicant Card to this office immediately after completion of the well. **CAUTION: There may be local health requirements for the actual siting of your well. Please check with the proper local authority before construction begins. See the enclosed sheet addressing construction information.**

DRILLER (START) CARD for Monitor WELL#: 0515005M00

IMPORTANT: THIS CARD MUST BE RECEIVED BY THE DIVISION OF WATER RIGHTS PRIOR TO THE BEGINNING OF WELL CONSTRUCTION -- REQUIRED ONLY FOR WELLS DEEPER THAN 30 FT.

OWNER/APPLICANT NAME: TOOELE ARMY DEPOT

MAILING ADDRESS: SIOTE-CO-EO (BLDG 8). TOOELE ARMY DEPOT. TOOELE UT 84074

PHONE NUMBER:

WELL LOCATION: You are authorized to drill 3 Monitor Wells. SEE BELOW.

WELL UTM COORDINATES:

WELL ACTIVITY: NEW (X) REPAIR ( ) REPLACE ( ) ABANDON ( )
CLEAN ( ) DEEPEN ( )

For surface seals in unconsolidated formations (clay, silt, sand, and gravel), will you be using a temporary conductor casing or other formation stabilizer (e.g., drilling mud) in the surface seal interval to maintain the required annular space?

YES or NO (Circle one).

Answering 'NO' suggests that you will be placing the surface seal in an open and unstabilized annular space, which may require onsite inspection of seal placement by the State Engineer's Office.

PROPOSED START DATE:

PROJECTED COMPLETION DATE:

LICENSE #: LICENSEE/COMPANY:

Licensee Signature Date

NOTICE TO APPLICANT: THIS CARD IS TO BE GIVEN TO A UTAH LICENSED WATER WELL DRILLER FOR SUBMITTAL TO THE DIVISION OF WATER RIGHTS PRIOR TO WELL CONSTRUCTION.
STATE OF UTAH DIVISION OF WATER RIGHTS Phone No. 801-538-7416
Fax No. 801-538-7467

MONITOR WELL LOCATIONS:

(1) N 865 E 780 from the SW corner, S30 T 3S R 4W SLBM
(2) N 4134 E 3159 from the SW corner, S30 T 3S R 4W SLBM
(3) N 2047 W 455 from the SE corner, S25 T 3S R 5W SLBM

WELL DRILLER'S REPORT
State of Utah
Division of Water Rights

For additional space, use "Additional Well Data Form" and attach

Well Identification

Non-Production Well: 0515005M00 WIN: 34484

Owner *Note any changes*

TOOELE ARMY DEPOT
SIOTE-CO-EO (BLDG 8)
TOOELE ARMY DEPOT
TOOELE UT 84074

Contact Person/Engineer: Richard Jirik / Parsons

Well Location *Note any changes*

~~NXXXXXXXXX~~ from the SW corner of section 30, Township 3S, Range 4W, SL B&M
N 740 E 670

Location Description: (address, proximity to buildings, landmarks, ground elevation, local well #) C-47

Drillers Activity Start Date: July 27, 2005 Completion Date: September 23, 2005

Check all that apply: ☒ New ☐ Repair ☐ Deepen ☐ Clean ☐ Replace ☐ Public Nature of Use: Monitor Well

If a replacement well, provide location of new well. _____ feet north/south and _____ feet east/west of the existing well.

DEPTH (feet) FROM	TO	BOREHOLE DIAMETER (in)	DRILLING METHOD	DRILLING FLUID
0	380	9	Percussion Hammer	Air

Well Log

DEPTH (feet) FROM	TO	WATER	PERMEABLE High	PERMEABLE Low	UNCONSOLIDATED CLAY	SILT	SAND	GRAVEL	COBBLES	BOULDER	OTHER	CONSOLIDATED ROCK TYPE	COLOR	DESCRIPTION AND REMARKS (e.g., relative %, grain size, sorting, angularity, bedding, grain composition density, plasticity, shape, cementation, consistancy, water bearing, ordor, fracturing, minerology, texture, degree of weathering, hardness, water quality, etc.)
0	349						X	XX						
349	380	X					X	XX						

Static Water Level

Date August 10, 2005 Water Level 349 feet Flowing? ☐ Yes ☒ No
Method of Water Level Measurement WLI If Flowing, Capped Pressure N/A PSI
Point to Which Water Level Measurement was Referenced Ground Level Elevation N/A
Height of Water Level reference point above ground surface N/A feet Temperature N/A degrees ☐ C ☐ F

Construction Information

DEPTH (feet) FROM	DEPTH (feet) TO	CASING TYPE AND MATERIAL/GRADE	WALL THICK (in)	NOMINAL DIAM. (in)	DEPTH (feet) FROM	DEPTH (feet) TO	☒SCREEN ☐PERFORATIONS ☐OPEN BOTTOM SCREEN SLOT SIZE OR PERF SIZE (in)	SCREEN DIAM. OR PERF LENGTH (in)	SCREEN TYPE OR NUMBER PERF (per round/interval)
0	349	4" Sch. 40 PVC	40	4	349	379	.010	4	Factory Sl

Well Head Configuration: Flush Mount Access Port Provided? ☒Yes ☐No

Casing Joint Type: FLush Thread Perforator Used: N/A

Was a Surface Seal Installed? ☒Yes ☐No Depth of Surface Seal: 345 feet Drive Shoe? ☒Yes ☐No

Surface Seal Material Placement Method: Tremie Bentonite Pellets and Bentonite Grout

Was a temporary surface casing used? ☒Yes ☐No If yes, depth of casing: 380 feet diameter: 9 inches

DEPTH (feet) FROM	DEPTH (feet) TO	SURFACE SEAL / INTERVAL SEAL / FILTER PACK / PACKER INFORMATION: SEAL MATERIAL, FILTER PACK and PACKER TYPE and DESCRIPTION	Quantity of Material Used (if applicable)	GROUT DENSITY (lbs./gal., # bag mix, gal./sack etc.)
0	340	Bentonite Grout	84 Bags	50 lbs each
340	345	Bentonite Pellets	2 Buckets	50 lbs each
345	380	16 - 40 Silica Sand	26 Bags	50 lbs each

Well Development and Well Yield Test Information

DATE	METHOD	YIELD	Units Check One GPM	Units Check One CFS	DRAWDOWN (ft)	TIME PUMPED (hrs & min)
	N/A					

Pump (Permanent)

Pump Description: N/A Horsepower: Pump Intake Depth: feet

Approximate Maximum Pumping Rate: Well Disinfected upon Completion? ☐Yes ☐No

Comments Description of construction activity, additional materials used, problems encountered, extraordinary Circumstances, abandonment procedures. *Use additional well data form for more space.*

Well Driller Statement This well was drilled and constructed under my supervision, according to applicable rules and regulations, and this report is complete and correct to the best of my knowledge and belief.

Name LAYNE CHRISTENSEN COMPANY (Person, Firm, or Corporation - Type or Print) License No. 626

Signature (Licensed Well Driller) Date September 28, 2005

APPENDIX B

7/27/05 Wednesday weather: clear, 70-90° 10 mph wind to NW

7:05 I arrive at Parsons field office at Tooele Army Depot (Matt Ivers - Kleinfelder geologist)

7:20 Tom Kerr calls. They are at the Layne Geoconstruction Shop building a water misting device into thier discharge cyclone because we are drilling the next hole (DC-47E) in a known source area and will need to not let airborn cuttings escape site. They will be an hour or so

10:10 Crew (Tom Kerr & Jake Smith) arrive at site. They will mobilize equipment to DC-47E on the west side of building 615 where A-Core concrete cutter is cutting a 12" hole and a 4X4 cut in the concrete surface for us to drill through. The drill was left onsite overnight and has been move south about 10' by unknown persons to gain access to the bay door we were blocking. I move the truck forward for A-core to access hole location. MP had dropped a rolloff for soil cutting off yesterday.

11:40 Crew is afixing a cloth "sock" over the top of the cyclone to trap fines that are escaping upwards. Richard needs recent water levels from C-21 + C-19. I need a longer water level meter for these so I go to Visalia to borrow one

12:45 Water levels C-21: 358.93 C-19: 346.17 ft toc
I return tape to Visalia

15:10 Crew is ready to drill but painting facility adjacent to us has freshly painted metel work drying in the yard next to us and they would be ruined by hammer pats of grease/oil that fall from the head while drilling. We go pump water off drums from C-45 drilling & decanting into new Baker tank in yard

16:30 By doing this we reduce C-45 cuttings from 6 to 3 drums

17:15 Paperwork complete. I leave site

Matt Ivers 7/27/05

August 4, 2005 Thursday weather: clear, 70-80° no wind

7:06 I arrive at field office

7:23 Tom and Jake arrive. They set up to decon both pipe trucks. We do a rig inspection before drilling next hole and notice a fraying fan belt. Tom will need to go to Tooele for another. Tom releases sand line so I can take lifting bail off well and get a water level W.L. = 352.4

8:05 Ron from A-core onsite to cut hole for C-47F as well as 42" square around the hole for later surface completion

9:30 Ron shows at field office and we call Richard with invoice

9:40 Ron leaves site

12:05 Crew has rig, pipe truck, and auxillary compressor in place. We have H2S tailgate.

12:18 Crew heads to town for the fan belt. I wait for MP Environmental to deliver rolloff bin to site

12:30 Tom calls from town. Fan belts won't be in till about 16:00 He is going home as his daughter is having surgery this morn/afternoon. Richard calls and is in agreement I will wait for rolloff and work on well construction Diagrams for D-17, D-18, D-19 and D-25 for the reports and for Veolias files

13:40 I talk to Ron at MP. He says if I am not in a hurry rolloff will be later today so he can give the hours to his drivers rather than himself the Dispatcher. Carl Cole stops by field office for an update

14:20 Kirt Alloway onsite

15:50 Ron (MP) arrives with rolloff We unload at C-47F

16:30 Back at field office

17:03 Offsite. [signature] 8/4/05

August 5, 2005 weather clear (75-95°) winds 15-20 mph to N-NW

6:30 I arrive at field office & get water level meter

6:45 I take water level at C-48f with no rig over hole I get a good reading. W.L. = 351.65

6:52 I arrive at OG6 to give Jeff Hamman meter. I just missed him as he is driving toward plant

7:40 Crew arrives at C-47f. Tom is fixing fan belts

9:05 I do rig inspection and take some photos of site setup. I calibration check PID. 106.6 on 100 ppm isobut.

8:40 We have H&S tailgate. Topic: Nearness to source area Kurt Alloway onsite. I lable bin with Haz Waste lable and Parsons # PARSNZ0521701

I set up cones for exclusion zone as strong winds will tear down tape

9:04 Kurt leaves site

9:19 Begin drilling from surface

10:08 @ 50' - fuel line leaking

10:25 Drilling again

10:57 @ 70' the hose to the chain wheel motor has a pinhole leak. Crew must take to town to repair as hydraulic fluid is spraying out and about

11:15 Carl Cole onsite

11:25 Carl offsite

12:06 Crew returns with hose

12:26 Drilling at 70'. They have hooked up auxillary compressor (Sulair 900)

12:41 @ 84' the fuel line breaks at the nut at the top. Recoil Dampner is not appearing to be fouling so we add a new funnel and try again

13:01 Drilling again

13:05 @ 90' the auxillary compressor is leaking and freeze It is extreemly hot being up against the west wall of this building (615)

13:22 Drilling again

August 5, 2005 ~~weather~~ MI (cont)

14:05 @ 130 Carl Cole outside briefly

14:32 @ 150 ft crew must bring w 2ND pipe truck

16:08 @ 195 MP arrives to move rolloff so we must quit drilling

16:35 Rolloff on truck. We take it to 90 Day yard
Tom goes to field office to do dailies

16:50 Back at C-47f we move a new empty rolloff under cyclone

17:10 Back at field off to review driller dailys

17:20 Crew leaves site

17:35 I leave for weekend

M Hoffman 8/5/2005

Monday 8/8/05 weather partly cloudy, 75-95° mid 20 mph winds to NW

6:40 I arrive at Parsons field office
7:45 Tom and Jake arrive at C-47f, fuel rig, move new rolloff under cyclon
9:10 We have H&S tailgate
9:25 I do rig inspection and calibrate PID (104.8 on 100 ppm iso
8:38 Begin drilling at 195. I table new rolloff PARSN050522001
12:37 @ 290 we shut down to let head cool.
13:05 Lightning causing further delay. Carl Cole onsite with locks for C-48f and C-47f.
13:50 The hing on the rolloff lid breaks. We work to repair
14:32 Lightening has dissipated. Begin drilling @ 290
16:45 @ 335 Head is very hot & fuel is leaking from injector as a result. The ground (soil) is strongly cemented quartzites and penetration rate is very low. We shut down for today.
17:10 Crew leaves site
17:35 I leave field office

W. Hoffman 8/8/05

August 9, 2005 Tuesday — overcast (~65-85°) 10-20 mph gusts to NNE

6:38 I arrive at field office.
7:20 Tom & Jake arrive. We have his S tailgate
7:40 I do rig inspection. Jake dons harness to go up and fuel the head.
7:50 Jeff Hausmann (Veolia) is onsite to develope C-48f. I calibration check PID. (105.1 on 100ppm isobut)
8:05 @ 335 Tom begins drilling while Jake takes truck to get more fuel
9:01 @ 342 Jake is back. Crew fuels rig and compressor
9:23 Drilling @ 342
11:51 @ 360 Head is overheated. Last 10' took 1 hr 47 min We break to cool it down
12:27 Carl Cole onsite
12:32 Drilling at 360
13:23 380' bgs. We try to get a water level but hole has sealed off and is dry so we pull 10' of casing and check again
14:15 Water Level is staying steady at 354.1 ft bgs. Tom Drills back down to 380 to set well
15:45 Crew has lowered a 4" diameter 4" long schedule 40 PVC well cap, 3-10' sections of 4" schedule 40 .010 slot screen and 35-10' sections of 4" schedule 40 blank PVC threaded pipe. Once on bottom casing top is about 1 foot above ground surface. I take a water level through well casing but it is down around 370 so it must have sealed off
16:00 Crew has clean up and need to move sand and grout to site so we will leave the well sitting on bottom overnight to see if water comes up. This is an issue because this is a "water level well" and the USACE has designed it to be

8/9/05 (cont)

25 feet of screen below water level and 5 feet above so knowing true static level is critical. We were somewhat fooled on C-48f so we will give it overnight to equilibrate and if not we will use our original measurment of 354.1 'bgs

16:07 I head over to C-48f to check on development and Veolea

16:45 C-48f is cleaning up quickley. Head to field office

17:44 Finished reports up to Friday leave site. Kurt is moving has waste roll off PARSNZONS052001 to 90-Day yard with MP

8/9/05

Wednesday 8/10/05 weather: partly cloudy 65/85 breeze to N

6:38 I arrive at field office, get water meter and head to C-48f where Jeff Hartmann (Veolia) is doing the pumping portion of development of C-48f. I expected he would need the Meter I had borrowed for the draw down portion of the pump test but he had been there since 6:00 am and had brought another meter

7:10 Crew arrives at C-47f. Ricky Smith is joining Tom and Jake for well construction today.

7:25 Crew move head off well so I can take a water level. W.L. = 366.6 so aquifer is still partially sealed off with casing and we could pull up without sanding in well so we will use the 354.1 ft bgs water level attained yesterday. We will screen the well from 379' to 349 leaving 5 feet of screen above water level and 25 feet below We will also sand to 3' above screen so sand from 380 to 346 = 34' of sand. The hole annular volume for a 9" hole with a 4" well = 0.35 ft^3/ft as previously calculated on page 5 of this logbook. 34' x 0.35 ft^3/ft = 11.9 ft^3 Each bag (50lb bag of 16-40 colorado silica) is approx 0.5 ft^3 ∴ it should take ~ 24 bags to fill this interval

8:15 Before beginning we have H2S tailgate Topic: exclusion zone

8:30 I do a walkaround inspection of the drill rig. The cyclone stand cracked yesterday and will require repair befor beginning a new hole and the recoil dampner on the head will require rebuilding as well. Crew intends to take the rig in to shop tommorow for repair

8:40 Crew begins placing sand pack

10:26 26 bags of sand have brought top of sand pack to

8/10/05 (cont)

3295.0 ft bgs. Crew will now add 2 buckets (5 gallon) of Cetco ¼" coated bentonite pellets and sound the top of the seal at 389.3 ft bgs. Crew hydrates with 10 gal of source water

11:10 2 guys from Utah Fabrication stop by to see if they could aid us in pulling out the concrete from the saw cut ~~rectangle~~ squares around C-48f and C-47f. They will get us a bid today but doubt they could get the work done this week so our option might be to move on the the next monitoring well installation. Kurt and Carl are down trying to pick a location and then Kurt would need to procure signatures by Thursday P.M. in order to do this

12:30 Crew is grouting well

12:45 I phone Gary Parker and schedule a water pickup at Water Well 3 for 13:45

13:15 Terry (MP Mechanic) arrives to fix lid on roll off bin in 90-Day yard. I go over with him

13:40 Roll off repaired, I return to field office

14:10 Tom Kerr calls. No one has showed up at Water Well 3 I call Gary Parker. He forgot about the appointment but will run right over.

Crew has 220 feet of casing out of the hole so far. They are grouting with 50 lb bag of Pure Gold powdered bentonite grout mixed with 11 gallons of water. That makes 2.2 ft^3 of 30% solids slurrey which wieghts 10.0 - 10.2 lb/gallon. Crew mixes 2 bag batches at a time and pumps into the envelope at the top of the borehole

$393' \times 0.35\ ft^3/ft = 137.55\ ft^3 / 2.2\ bag/ft^3 = 62\frac{1}{2}$ bags

13:05 I go to Diamond rental to pick up tractor so Kurt can mow the grass at our next well location

8/10/05 (cont)

15:40 Back at field office we unload tractor and Kurt takes off. I call security to open OG6 gate for him. I head to C-47f

16:20 Crew has grouted to the surface with 80 bags of bentonite. They still have 40 feet of casing to pull from hole

16:40 Kurt returns from mowing and loads up mower on trailer to return to rental

17:07 I go to C-47f crew has completed grouting to the surface with all casing out of hole 84 bags used - 22 more than the estimated 62. I reset exclusion zone for the night

17:45 DQC reports and FAR complete to date I leave site

8/10/05

Thursday 8/11/05 weather: clear 70/90° slight breeze

6:45 I arrive at field office

7:10 Tom and Jake onsite. They will be decanning rig and both pipe trucks today and then mobalizing rig back to Layne shop. We have H&S tailgate

8:00 I meet Ned (NP driver) at 90-Day yard and take him to the TEAD main gate security where we procure vehicle passes and visitor badges. We will be taking contents of the 1st Baker Tank (D-17, D-18, D-19) to the water treatment plant through the OG-6 gate.

9:15 Return from Security and load 1st half of tank into tanker truck. Tom & Jake are onsite ~~Jess~~ MS with mast up to break bit off casing. The hammer is partially dismantled. I take photos of both.

9:50 We head to treatment plant. Steve Kubala lets us in the OG-6 gate.

11:20 Head back to 90 day for second load. Tom and Jake are going to get badges. They have finished D-con'ing rig and pumped out sump into Baker Tank but have not yet pumped free water out of C-47f rolloff

11:50 Ned heads to treatment plant with second load Mark Baer lets him in gate. I head to field office Kurt is getting water buffalo filled at WW3 for fire protection at next well - C-49

12:40 Kurt is back at field office - he was able to obtain an excavation permit for C-49

13:20 Tom & Jake are back at 90-Day Decanning pipe truck

14:10 Tom & Jake mobilize rig back to Layne for repairs

14:50 I have completed DQC and EAR & leave site

[redacted] 8/11/05

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 7/27/2005

Site: SWMU 58 - TEAD Arrival Time: 7:05

Team Leader: Richard Jirik Departure Time \Destination: 7:15

Team Members: Matt Ivers, Kurt Albaugh Weather: clear 70-90° 10 mph to NW

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development _____
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time _____ People Present Tom Kerr, Jake Smith, Matt Ivers

Topics Discussed: _____

Logbook Book # 2MI Page # 1

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N **Current Location:** **Update DITF?: Y / N**

Notes: 7:05 Arrive at field office 7:20 Crew calls. They are at Layne shop working on misters for cyclone dust supression as we are drilling in known source area 10:10 Crew arrives A-core is onsite cutting a hole for C-47 west side of 615 12:45 Water Levels C-21 = 358.93 C-19 = 346.17 ft TOC 15:10 Ready to drill but newly painted hardware next to rig necessitate delay. We go to 90-Day to pump off drums from C-45 Drilling and Decanning into new Baker Tank 17:15 Offsite

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 8 / 4 / 2005

Site: SWMU 58 - TEAD Arrival Time: 7:06

Team Leader: Richard Jirik Departure Time \Destination: _____

Team Members: Matt Ivers, Kurt Albaugh Weather: clear, 70-90°, no wind

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development 7
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time 12:05 People Present Tom Kerr, Jake Smith, Matt Ivers

Topics Discussed: Adjacent building hazards, Traffic hazards

Logbook Book # 2MI Page # 10

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N **Current Location:** **Update DITF?: Y / N**

Notes: 7:06 I arrive at field office. 7:23 Crew arrives and sets up to decon. During rig inspection we observe 2 failing fan belts. I take W.L. = 352.4 8:05 A-cave outside to cut hole for C-47f 9:40 A-cave offsite 12:05 Rig, pipe truck compressor in place. We have H&S tailgate 12:18 Crew to town for fan belts 12:30 No belts available. Tom daughter is also having surgery. We break till tomorrow. I wait for rollaff & work on Previous D well construction diagrams 13:40 Carl Cole at field office

Attachment 1-2

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 8 / 5 / 2005

Site: SWMU 58 - TEAD Arrival Time: 6:30

Team Leader: Richard Jirik Departure Time \Destination: 17:35

Team Members: Matt Ivers, Kurt Albaugh Weather: clear (75-95°) wind 10-20 mph N-NW

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development _____
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time 8:40 People Present Tom Kerr, Jake Smith, Matt Ivers

Topics Discussed: Proximity to source area

Logbook Book # 2MI Page # 11, 12

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N **Current Location:** **Update DITF?: Y / N**

Notes: 6:30 Arrive at field office 6:45 C-47f water level 351.65 ft bgs 6:52 Head to OG6 to return meter 7:40 Crew arrives & fixes fan belts 8:05 Rig inspection & site photos. Check calibration of PID 8:40 H&S tailgate. Lable bin PARSN20521701 9:19 Begin drilling at surface 10:57 Hose leak 12:26 Drilling again w/ auxo compressor @ 70' 16:08 @ 195' M.P. arrives & takes readoff to 90-Day yard and drop new empty one at rig for monday 17:10 Meet Crew at office for review of Darleys 17:35 offsite

Attachment 1-2

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 8/8/2005

Site: SWMU 58 - TEAD Arrival Time: 6:40

Team Leader: Richard Jirik Departure Time \Destination: 17:35

Team Members: Matt Ivers, Kurt Albaugh Weather: partly cloudy 20mph winds to NW

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development _____
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time 8:10 People Present Tom Kerr, Jake Smith, Matt Ivers

Topics Discussed: Fuel & Chemical Safety

Logbook Book # 2MI Page # 13

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N Current Location: Update DITF?: Y / N

Notes: 6:40 I arrive on site at field office 7:45 Tom + Jake arrive, fuel rig, move rolloff 8:10 H&S tailgate 8:25 I do rig inspection and calibrate PID 8:38 Begin drilling at 195. Rolloff labeled PARSNZ052300 1 12:37 @ 290 head overheating 13:05 Lightning delay 13:50 rolloff 1/2 hour breaks 14:32 Lightning dissapated Drilling at 290 16:45 @335 Head is too hot & leaking fuel 17:10 Crew leaves site 17:35 I leave field office

Attachment 1-2

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 8 / 9 / 2005

Site: SWMU 58 - TEAD Arrival Time: 6:38

Team Leader: Richard Jirik Departure Time \Destination: 17:44

Team Members: Matt Ivers, Kurt Albaugh Weather: overcast/clear 65/95° 10-20 mph gusts to NE

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development _____
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time 7:20 People Present Tom Kerr, Jake Smith, Matt Ivers

Topics Discussed: Horseplay hazards

Logbook Book # 2MI Page # 14, 15

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N **Current Location:** **Update DITF?: Y / N**

Notes: 6:38 I arrive at field office 7:20 Tom & Jake arrive. We have H&S tailgate 7:40 I doing inspection. Jake fuels head 7:50 Jeff Hannaman onsite to develope C-48f. I calibrate check PID 8:05 Begin drilling @ 335' 11:51 Head overheating - break @360 12:32 Drilling at 360 again 13:23 380' bgs 14:51 W.L = 354.1 15:45 Well casing with 30 foot screen lowered to hole bottom 16:00 Crew mobilizes construction materials - leave overnight for accurate w.l. 16:07 Check development @ 16-48f 17:44 Reporting complete - offsite

Attachment 1-2

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 8/10/2005

Site: SWMU 58 - TEAD Arrival Time: 6:38

Team Leader: Richard Jirik Departure Time \Destination: 17:45

Team Members: Matt Ivers, Kurt Albaugh Weather: Partly cloudy 65/95° breeze to N

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development _____
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time 8:15 People Present Tom Kerr, Jake Smith, Matt Ivers, Ricky Smith

Topics Discussed: Exclusion Zone

Logbook Book # 2MI Page # 16,17

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N **Current Location:** **Update DITF?: Y / N**

Notes: 6:38 Arrive at site - go to C-48f where Veolia is pump/developing well 7:10 Crew arrives - can't get good W.L - sealed off Ricky Smith is addition to crew today 8:15 HS tailgate 8:30 Rig inspection 8:40 Begin placing sand - Calculated volume 24 bags 10:26 20 bags to 345.8 2 buckets pellets to 339.3. Hydrate w/10 gal H2O 12:30 Grouting well 13:15 MP onsite to fix roll off lid 13:40 MP offsite 14:10 Get water at water well 3 15:05 To Diamond rental to pick up tractor to mow grass 15:40 Kurt thru OG6 to mow grass 16:20 Grout to surface - 80 bags 4x10 pipe still in hole 16:40 Kurt returns - grass mowed 17:07 grout complete 84 bags 17:45 DQC and FAR complete. I leave site

Attachment 1-2

FIELD ACTIVITY REPORT

Project Number/WBS: 744139-20010 Date: 8 / 11 / 2005

Site: SWMU 58 - TEAD Arrival Time: 6:46

Team Leader: Richard Jirik Departure Time \Destination: 14:50

Team Members: Matt Ivers, Kurt Albaugh Weather: clear 70/90 slight breeze

Purpose: (Attach all appropriate forms)

- ☐ Geophysical Survey
- ☐ Soil Gas Survey
- ☐ Hydropunch
- ☐ Test Pit
- ☐ GPS
- ☐ CPT
- ☐ Other (specify) _____
- ☒ Well Installation C-47f
- ☐ Well Development _____
- ☐ Microwell Sampling
- ☐ Monitor Well Sampling
- ☐ Vertical Boring
- ☐ Angle Boring
- ☐ Hand Auger
- ☐ Surface Soil Sampling

Protection Level: ☒ D ☐ C ☐ B ☐ A

Health and Safety Briefing: Time 7:10 People Present Tom Kerr, Jake Smith, Matt Ivers

Topics Discussed: Steam cleaner hazards

Logbook Book # 2MI Page # 19

Photos Camera # _____ Roll # _____ Frame # _____

IDW Drums: Purge / Rinse / Soil Drum Number(s): ES

Closed?: Y / N **Current Location:** **Update DITF?: Y / N**

Notes: 6:45 Arrive at field office 7:10 crew onsite. we have H&S tailgate 8:00 Head to TEAD security with Ned (MP driver) for badges & vehicle passes 9:15 Back at 90-Day load ½ Baker tank & take to Veolia - Crew is decontaminating rig 11:20 Back at 90-Day for the other ½ load 11:50 Ned to Veolia from OG6 12:40 Kurt was able to get drg permit for C-49 and fill water trailer for rig 13:20 Crew Decons pipe truck - also got badges & passes 14:10 Crew leaves site with rig to take to shop for repairs 14:50 DQC & FAR complete. I leave site

Attachment 1-2

HEALTH AND SAFETY BRIEFING

Date: 7 / 27 / 05 C-48F 7 Time: 15:45

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. [signature]	11.
2. [signature]	12.
3. [signature]	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. The building we are drilling adjacent to is
2. in very poor condition. Loose siding, fixtures,
3. raingutter and plywood & steel sheeting are
4. all potential hazards due to wind and vibration
5. of the hammer. Keep a constant eye on it
6. looking for signs of failure
7.
8.
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

HEALTH AND SAFETY BRIEFING

Date: 8 / 4 / 05 C-47f Time: 12:05

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. Matt Lund	11.
2. Jacob Miller	12.
3. Tom Keen	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. Again we have located ourselves immediately against
2. the delapidating west side of building 615. The
3. vibration of the hammer has the potential to
4. dislodge siding or fixtures from the building. Keep an
5. eye on things as time progresses. Also be aware of
6. potential traffic from around either side of the
7. building
8.
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

HEALTH AND SAFETY BRIEFING

Date: 8 / 5 / 05 C-47f Time: 8:50

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. [signature]	11.
2. Tom Ka	12.
3. Jacob Hfaith	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. While drilling C-47f we are located in a very likely
2. source area and there is an unusually high
3. possability of encountering impacted soils with
4. high VOC content right from the surface. Wear
5. nitrile gloves if handling cuttings. I will do continuous
6. air monitoring with the PID. If you notice any
7. odor let me know
8.
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

HEALTH AND SAFETY BRIEFING

Date: 8/8/05 C-47f Time: 8:10

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. [signature]	11.
2. Jack Smith	12.
3. Tom Ka	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. Be aware of good habits involving fuel and
2. chemicals on the job site. Have MSDS's at
3. hand. Wear nitrile gloves when handling these
4. items.
5.
6.
7.
8.
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

HEALTH AND SAFETY BRIEFING

Date: 8 / 9 / 2005 C-47f Time: 7:20

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. [signature]	11.
2. [signature]	12.
3. [signature]	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. While slow drilling can be boring DO not give in
2. to the temptation of filling the time with
3. horseplay or monkeying around. Do something
4. constructive and non hazardous with your time
5.
6.
7.
8.
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

HEALTH AND SAFETY BRIEFING

Date: 8 / 10 / 05 C-47F Time: 8:15

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. [signature]	11.
2. [signature]	12.
3. [signature]	13.
4. [signature]	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. The exclusion zone exists for your protection
2. from liability claims from others. Try to
3. maintain the integrity of the exclusion zone
4. for others safety and for your defensability
5. in case of litigation resulting from unforseen
6. accidents to non project related personel that
7. may wander into the work area unaware
8. of the existing hazards
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

HEALTH AND SAFETY BRIEFING

Date: 8 / 11 / 05 C-47f Time: 7:10

Site Health and Safety Officers(s)

ATTENDEES SIGNATURE

1. [signature]	11.
2. Tom Kan	12.
3. [signature]	13.
4.	14.
5.	15.
6.	16.
7.	17.
8.	18.
9.	19.
10.	20.

AGENDA

1. Decanning involves the use of very hot
2. high pressure stream of water which can easily
3. cut through skin and the wand can become
4. hot enough to burn skin. Always wear gloves
5. when operating steam cleaner and never
6. point wand at another individual. Always
7. wear eye protection with side shields to avoid
8. splattering grease or soil
9.

NOTE: Site specific health and safety (tailgate) briefings will be conducted each morning at the work sites by the field team leader. Briefings will be documented in the field log.

Layne Christensen Company Job Site Safety Audit

Date	Site	Client
8/4/2005	TEAD - Phase II RFI @ SWMU 58	USACE

Rig/Crew: Tom Kern, Jake Smith C-47f

Observers: Matt Ivers

Crew Safety/PPE	YES	NO	N/A		YES	NO	N/A
Hard Hat	☑	☐	☐	Safety Glasses	☑	☐	☐
Lifting Belt	☐	☑	☐	Training Certificates	☐	☐	☑
Gloves	☑	☐	☐	Hearing Protection	☑	☐	☐
Safety Shoes	☑	☐	☐	Proper Clothing	☑	☐	☐
Layne Safety Practice Manual	☐	☐	☑	Dust masks/Level C respirators (if needed)	☑	☐	☐
DOT physical card, CDL and logbooks present and up to date?	☐	☐	☑	Emergency numbers/HASP present and posted?	☑	☐	☐

Comments: Emergency #'s in back page of log book
Training certs collected prior to program

Site Set-up and Safety							
Hole openings covered or tied off?	☐	☐	☑	Timbers and set-up jacks stable?	☑	☐	☐
Anchor guy lines secure, evenly tensioned and flagged?	☐	☐	☑	Mud or circulation pits barricaded or fenced?	☐	☐	☑
Excavation permit (CA) and shoring considerations?	☑	☐	☐	Traveling blocks, widow makers and elevators inspected?	☐	☐	☑
Site clean and organized? Footing?	☑	☐	☐	Bulk fuel stores lined and grounded?	☐	☐	☑
Pipe blocked and sloped from work area?	☑	☐	☐	Correct monitoring equipment present?	☑	☐	☐
Overhead and underground lines identified?	☑	☐	☐	Chemicals stored away from fuel and protected?	☐	☐	☑
Material Safety Data Sheets present?	☐	☐	☑	Warning signs/Exclusion zone posted?	☑	☐	☐

Comments: PID onsite for air monitoring
Utility meet with Don Yea (UID) on 8/3/05

Rig Safety							
Kill switch operational?	☑	☐	☐	All mast wiring in conduits?	☑	☐	☐
Vehicle pretrip inspection performed and documented?	☐	☐	☑	Seat belts available and used on all equipment?	☐	☐	☑
Fire extinguisher present and charged?	☑	☐	☐	First aid/BBP kit present and stocked?	☑	☐	☐
Danger points color coded?	☐	☐	☑	Controls identified?	☑	☐	☐
Side guardrails on platform rigs?	☐	☐	☑	Ropes and chains in good condition?	☑	☐	☐
Belts and rotating shafts guarded?	☑	☐	☐	All hooks have safety latches?	☑	☐	☐
Cables in good shape, clamps installed properly?	☑	☐	☐	Pressure hoses safety chained at connections?	☑	☐	☐
Good housekeeping in vehicle cabs?	☐	☐	☑	Spill control materials present?	☑	☐	☐

Rig Safety (cont'd.)	YES	NO	N/A		YES	NO	N/A
DOT #53175 and inspection stickers present and up to date?	☐	☐	☑	Bill of lading, HAZMAT CDL and placarding for hazardous materials hauled?	☐	☐	☑
Climbing blocks and body harness installed, available and used?	☑	☐	☐	Heaters and engines vented outdoors and extinguished?	☐	☐	☑

Comments: Reinspect Rig each morning before shift
- Cyclone bracket cracked on 8/9/05 and will need rewelding prior to next hole
- Recoil Dampner will also require replacement

Tool and Equipment Safety							
Spinning chains have rope tail? *	☑	☐	☐	Safety cans used for gasoline storage?	☑	☐	☐
Tools and slings in good condition?	☑	☐	☐	All generators grounded?	☑	☐	☐
Compressed gas bottles secure and upright?	☐	☐	☑	GFI used and electrical cords in good condition?	☑	☐	☐
Tag lines used on hoisted pipe and equipment?	☐	☑	☐	Check valve at torch/hose connection and hoses in good condition?	☑	☐	☑

Comments: * Very short tail

Employee Training							
Employees instructed on safe equipment use?	☑	☐	☐	Heat stress breaks followed and documented?	☑	☐	☐
Knowledgeable of chemicals on site?	☑	☐	☐	First aid/CPR certified?	☑	☐	☐
Documented tailgate safety meeting before start of work?	☑	☐	☐	Applicable training up to date including respirator fit test, MSHA and/or OSHA.	☑	☐	☐

Comments: H & S tailgate topics 8/4/05 Adjacent building Hazards 8/8 Fuel & Chemicals
Traffic hazards 8/9 Horseplay Hazards
8/5/05 Proximity to Source Area 8/10 Exclusion Zone
8/11 Steam Cleaner Hazards

Confined Space Work							
Confined Space Entry Permit complete?	☐	☐	☑	Gas monitor on site?	☐	☐	☑
Ventilation equipment available?	☐	☐	☑	Body harness and safety line present?	☑	☐	☐

Pump Jobs/Well Rehabilitation/Filters and Vaults							
Lockout/Tagout on electrical controls?	☐	☐	☑	Chemical storage area secure?	☐	☐	☑
PPE for chemicals available?	☑	☐	☐	Water available for flushing chemicals?	☑	☐	☐
Cable spool and in safe position?	☐	☐	☑	Explosives stored and secured properly?	☐	☐	☑
Test pump engine drive shaft guarded?	☐	☐	☑	•			

Comments:

Auditor's Signature [signature] 8/4/05, 8/5/05 MJ, 8/8/05 MJ, 8/9/05 MJ

Driller's Signature Tom Ke 8/10/05 MJ, 8/11/05 Decon e Disassemble MJ

Helper's Signature Jake Smith

EQUIPMENT CALIBRATION LOG

Tooele Army Depot

Phase II RFI @ SWMU 58

Eqpt. Type PID	Serial No.	Date	Calibration Time	Calibration Gas	Calibration Gas Lot No.	Calibrated By:	Comments
MWI RAE2000	9296	6/29/05	9:25	100 ppm isobutelyne	82617-117	Matt Ivers	Monitoring well D-17
"	"	7/6/05	7:50	"	"	"	" D-18
"	"	7/14/05	8:10	"	"	"	" D-19
"	"	7/20/05	14:40	"	"	"	" C-45
"	"	7/28/05	10:40	"	"	"	" C-48f
"	"	7/29/05	7:30	"	"	"	" "
"	"	8/1/05	8:30	"	"	"	" "
"	"	8/5/05	8:05	"	"	"	" C-47f
"	"	8/8/05	8:25	"	"	"	" "
"	"	8/9/05	8:38	"	"	"	" "
"	"	9/20/05	8:50	"	"	"	" C-49

APPENDIX C

DRILLING LOG | DIVISION: Sacramento | INSTALLATION: Tooele Army Depot | SHEET 1 OF 10 SHEETS

1. PROJECT: TEAD Phase II RFI @ SWMU 58
2. LOCATION (Coordinates or Station): 7360556.94 N 1404815.63 E
3. DRILLING AGENCY: Layne Geoconstruction
4. HOLE NO. (As shown on drawing title and file number): C-47f
5. NAME OF DRILLER: Tom Kerw / Jake Smith
6. DIRECTION OF HOLE: ☒ VERTICAL ☐ INCLINED _____ DEG. FROM VERT.
7. THICKNESS OF OVERBURDEN: 380'
8. DEPTH DRILLED INTO ROCK: 0
9. TOTAL DEPTH OF HOLE: 380'
10. SIZE AND TYPE OF BIT: 9" OD 6" ID
11. DATUM FOR ELEVATION SHOWN (TBM or MSL):
12. MANUFACTURER'S DESIGNATION OF DRILL: Drill Systems AP1000 Becker Hammer
13. TOTAL NO. OF OVER-BURDEN SAMPLES TAKEN: DISTURBED 82 | UNDISTURBED —
14. TOTAL NUMBER CORE BOXES: —
15. ELEVATION GROUND WATER:
16. DATE HOLE: STARTED 8/5/05 | COMPLETED 8/10/05
17. ELEVATION TOP OF ~~HOLE~~ CASING 4824.53
18. ~~TOTAL CORE RECOVERY FOR BORING~~ GROUND 4825.63
19. SIGNATURE OF INSPECTOR: Matt Lunn

a	DEPTH b	LEGEND c	CLASSIFICATION OF MATERIALS (Description) d	RECOVERY e	SAMPLE NO. f	REMARKS (Drilling time, water loss, depth of weathering, etc., if significant) g
9:19	0					
	2		Clayey Gravel (GC) 70% Cobble + Gravel, subangular to subrounded, fine to coarse, 10% sand fine to coarse 20% clay, very dark brown 10YR 2/2, wet strong reaction to HCl -moderate plasticity	PID 3.4	1	Because the Becker Hammer Drilling Method allows a maximum clast size of about 6 inches to get to the surface, percentages of boulders, cobbles and gravel are speculative
	4					
	6			4.5	2	
	8					
9:24	10		Well Graded Sand w/Gravel (SW) 60% med to coarse sand 35% gravel, angular to subrounded, fine to coarse, 5% fines brown 10YR 5/3, moist strong reaction to HCl			0.5 min/ft
9:27	12			21	3	While clasts range from angular to rounded, many angular clast are likely created by the drilling process so as long as some waterworn clasts are observe in samples, bedrock will not be indicated
	14					
	16			0.2	4	
	18					0.4 min/ft
9:31	20					
9:35	22			0.5	5	Unless otherwize indicated, rock type represented in the cuttings consists of primarily varying percentages of tan to gray quartzite and gray to dark gray limestone and dolomite, with trace amounts of yellow brown sandstone Multicolored volcanics and a white silicate mineral
	24					
	26		Well Graded Gravel w/sand (GW) 70% cobble + gravel f to c, a to sr 30% sand med to coarse, brown 10YR 5/3, moist, strong HCl	0.2	6	
	28					
9:43	30					1.0 min/ft

Phase II RFI @ 58 | C-47f | DATE 8/17/05 | PAGE 2 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
9:46	32			1.1 (PID)	7		
	34						
	36			0.4	8		
	38						
9:55	40		Gravelly Clay (CL) high plasticity, 20% gravel clasts to 5", olive brown 2.5Y 4/3, moist, weak react to HCL			0.9 min/ft	
9:58	42			0.2	9		
	44		Well Graded Gravel w/sand (GW) 80% cobble + gravel clasts to 5", fine to coarse angular to subrounded, 10-15% sand, 5-10% clay, occasional slight plasticity, olive brown 2.5Y 4/3, moist, strong reaction to HCL				
	46			0.2	10		
	48						
10:08	50				11	1.0 min/ft	fuel line leak
10:25	52			0.0			
	54						
					12		
10:37	56			0.1			- fuel line leak
10:40	58						
10:44	60					1.6 min/ft	
10:47	62			0.0	13		
	64						
	66		Gravelly Clay (CL) 40% gravel, SA to SR, mostly fine some coarse grains 10% coarse sand 50% clay, high plasticity light brown 10YR 5/4, moist, weak HCL		14A		
					14B		
	68						
10:57	70					1.0 min/ft	Hose breaks to chain wheel

PROJECT Phase II RFI @ SWMU 58 | HOLE NO C-47f

Phase II RFI @ SWMU 58 | C-47f | DATE 8/5/05 | PAGE 3 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
12:26	72		Well Graded Gravel w/sand (GW) 70% cobble + gravel, A to SR f to C, clasts to 6", 20% Sand fine to med, 10% S.H Brown 10YR 4/3		15		
	74			0.0 (PID)			
	76				16		
	78			0.2			
12:34	80				17	0.8 min/ft	
12:37	82			0.6			
12:41	84						fuel line breaks
13:01	86				18		
	88		- Loam Clay (CL) high plasticity trace fine gravel, light brown 10YR 5/4, moist, weak HCL reac.	0.8			
13:05	90				19	0.8 min/ft	antifreez leaking from aux. compressor
13:22	92		- (GW) as above	1.6			
	94						
	96		- some minor cementation		20		
	98			0.2			
13:27	100				21	0.5 min/ft	
13:30	102			0.4			
	104						
	106				22		
	108			0.3			
13:40	110					1.0 min/ft	

PROJECT Phase II RFI @ SWMU 58 HOLE NO C-47f

Phase II RFI @ SWMU 58 | C-47f | DATE 8/5/05 | PAGE 4 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
13:43	112				23		
				3.5 (PID)			
	114		- Well Graded Gravel with sand and Silt (GW-GM) 70% cobble and gravel, ftoc, atosr 20% sand fine to coarse 10% silt, non plastic Olive brown 2.5Y 4/3 Moist, high reaction to HCl				
	116				24		
				1.6			
	118						
13:54	120					1.1 min/ft	
14:00					25		
	122			0.4			
	124						
	126				26		
				0.7			
	128						
14:05	130						
14:09					27	0.5 min/ft	
	132			0.0			
			- Lean Clay (CL) high plasticity yellowish brown 10YR5/6, moist weak HCl reaction strong cementation				
	134						
					28A		
	136		- Well graded gravel with clayey sand (GW) moderate plasticity 60% gravel / 40% sand + clay yellowish brown 10YR 5/6 moist, strong HCl reaction	0.0			
					28B		
	138			0.2			
14:14	140					0.6 min/ft	
14:18					29A		
			- Lean Clay (CL) high plasticity as above but very pale brown 10YR 7/4 with fine gravel	0.0			
	142						
					29B		
	144		- strongly cemented	0.9			
					30		
	146		- Silty Gravel (GM) 70% Gravel to 4", 20% Silt 10% fine sand, gray 2.5 6/1 Dry, strong HCl reaction	1.1			
	148						
14:32	150					1.4 min/ft	

PROJECT: Phase II RFI @ SWMU 58

HOLE NO: C-47f

Phase II RFI @ 58 | C-47f | [illegible] | DATE 8/5/05 | PAGE 5 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
14:55	152		Well Graded Gravel w sand and silt (GW-GM) 60% Gravel to 5", f to c a to SR, 20% sand, f to c 20% silt, non plastic grayish brown 10YR5/2 Moist to Dry, strong HCl reaction		31		
				0.4 (PID)			
	154						
					32		
	156			1.1			
	158						
15:05	160					1.0 min/ft	
15:08					33		
	162		- Lean Clay with fine gravel high plasticity, very pale brown 10YR 7/3, moist strong HCl reaction	0.6			
	164						
					34		
	166		- (GW-GM) as above - strongly cemented	0.2			
	168						
15:16	170				35	0.8 min/ft	
15:23				0.0			
	172						
	174						
					36		
	176			0.0			
	178						
15:36	180				37	1.3 min/ft	
15:45				0.1			
	182						
	184						
					38		
	186			0.2			
	188						
15:57	190					1.2 min/ft	

PROJECT: Phase II RFI @ SWMU 58

HOLE NO: C-47f

Phase II RFI | C-47F | DATE 8/8/05 | PAGE 6 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
16:00	192		Well Graded Gravel (GW) 90% cobble & gravel, angular to subrounded, fine to 6"+ 10% fine sand or silt grayish brown 10YR 5/2 Dry, Strong reaction to HCL - strongly cemented	0.0 (PID)	39		
16:08 8/8/05 8:38	194						
	196			0.0	40A		
	198			0.0	40B		
18:55 8:59	200						
	202			0.8	41	2.5 min/ft	
	204		- Clayey Gravel (GC) 70% gravel, angular to subrounded, fine to 5" 10% med to coarse sand 20% clay, moderate plasticity, yellowish brown, moist to almost wet weak HCL reaction				
	206			0.6	42		
	208						
9:42 9:46	210				43	4.3 min/ft	
	212			0.6			
	214		- Well Graded Gravel w/sand (GW) 60% gravel + cobble angular to subrounded, fine to 5" 30% sand, fine to coarse, 10% silt, non plastic, Brown 10YR 5/3 moist, strong reaction to HCL				
	216			0.2	44		
	218						
10:01 10:10	220					1.5 min/ft	
	222			0.0	45		
	224						
	226		- occasional strong cementation	1.8	46		
	228						
10:28	230					1.8 min/ft	

PROJECT: TEAD Phase II RFI @ SWMU 58

HOLE NO: C-47f

TEAP Phase II RFI | C-47f | DATE 8/8/05 | PAGE 7 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
10:33	232		- Well Graded gravel with sand and clay (GW) 60-70% gravel f to 7"+, a to sr, 30% sand 10-20% clay, brown 10YR 5/3, moist, strong HCl	0.0	47		
	234						
	236			0.6	48		
	238						
10:45	240						
10:48			- clay decreases to trace	0.0	49	1.2 min/ft	
	242						
	244						
	246			0.2	50		
	248						
10:56	250						
11:21				0.0	51	0.8 min/ft	
	252						
	254						
	256			0.0	52		
	258		- Silty Gravel, (GM) 80% cobble + gravel, a to sr f to 6"+, 20% silt, non plastic, gray, 10YR 6/1 dry, strong HCl, trace fine sand				
11:40	260						
11:45				0.0	53	1.9 min/ft	
	262						
	264						
	266			0.0	54		
	268		- Well Graded Gravel + Sand (GW) see next page				
12:03	270						

PROJECT: TEAD Phase II RFI @ SWMU 58

HOLE NO: C-47f

TEAD Phase II RFI | C-47f | Matt Lurie | DATE 8/8/05 | PAGE 8 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
12:10	272		Well Graded Gravel w/sand (GW) 70% Gravel, fine to 6" Angular to subround, 20% Sand, fine to med, 10% Silt, brown 10YR 5/3, moist strong HCL reaction		55		
				0.0			
	274						
					56		
	276			0.1			
			Silty Gravel (GM) as previously				
	278						
12:21	280						
12:25					57	1.1 min/ft	
	282			0.0			
	284						
					58		
	286			0.0			
	288		- Well graded gravel with sand (GW) as above				
12:37	290					1.2 min/ft	Head is hot! - Take a break - rolloff hing breaks - lightening Delay
14:32			- strongly cemented		59		
	292			0.2			
			- Well Graded Gravel with sand and silt (GW-GM) 60% Cobble + gravel, angular to subrounded, 20% Sand, fine to medium 20% silt brown 10YR5/3 to Gray 10YR 6/1, moist to dry, non plastic strong reaction to HCL				
	294						
					60		
	296			0.4			
	298						
14:51	300					1.9 min/ft	
14:54					61		
	302			0.2			
	304						
					62		
	306			0.0			
	308						
15:07	310					1.3 min/ft	

PROJECT: TEAD Phase II RFI @ SWMU 58

HOLE NO: C-47f

TEAD Phase II RFI | C-47f | Well Cover | DATE 8/8/05 | PAGE 9 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
15:10	312		Well Graded Gravel with sand and silt (GW-GM) 60% cobble + gravel, fine to 4" angular to coarse grain 20% sand, fine to med 20% silt or clay, non plastic brown 10YR5/3 to grey 10YR6/1 moist to dry, strong reaction to HCL, occasional strongly cemented areas	0.0 (PID)	63		
	314						
	316			0.1	64		
	318						
15:21	320					1.1 min/ft	
15:24				0.0	65		
	322						
	324						
	326			0.3	66		
	328						
15:46	330						
15:50				0.1	67	2.2 min/ft	
	332						
	334						
16:45							
8/9/05	336			1.3	68		
8:05							
	338						
8:60	340					10.0 min/ft	
8:54			Well Graded Gravel w/sand (GW) 70% gravel + cobble fine to coarse (4"+), 30% sand, med grain, clast are angular to subrounded, brown 10YR5/3, moist strong reaction to HCL		69		
9:01	342			1.4		fuel rig	
9:23							
	344						
	346				70A		
			Clayey Gravel (GC) 60% gravel, subang to subrounds fine to 5", 40% high plastic clay, very pale brown 10YR7/4 moist, almost wet, strong HCL	2.5			
	348				70B		
				0.4			
10:01	350					4.5 min/ft	

PROJECT some cemented boulders... TEAD Phase II RFI & SWMU 58

HOLE NO C-47f

TEAD Phase II RFI | C-47f | [illegible] | DATE 8/9/05 | PAGE 10 of 10

TIME	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE LOCATION	SAMPLE NO.	PENETRATION RATE	COMMENTS
10:09			Clayey Gravel as above		71		
	352		- strongly cemented	0.6			Eventual static water
	354		Well Graded Gravel with Silt and Sand (GW-GM) as above				▼ 154.1' bgs
	356				72		
	358		- strongly cemented	1.1			
11:51	360		- Well Graded gravel with sand (GW) 90% cobbel and gravel, fine to 5", angular to sub rounded, 10% med to coarse sand, BROWN 10 YR 5/3, Dry to moist strong reaction to HCL		73	10.7 min/ft	
12:32	362			0.5			
	364				74		
	366			0.7			
	368						First free water observed
12:46	370		- multicolored and wet		75	1.4 min/ft	▽ 370' bgs
12:50	372			0.0			
	374				76		
	376			0.0			
	378		- Silty Clay w/ gravel (20%) (CL) moderate plasticity strong brown 7.5YR 5/6 moist, moderate HCl react.				
13:23	380					3.3 min/ft	
					77		
				0.0			

PROJECT TEAD Phase II RFI @ SWMU 58

HOLE NO C-47f

311 Rock Avenue • Golden, CO 80401
PH 303.526.4432 • FAX 303.526.4426
email: PedlerRAS@aol.com • www.rasinc.org

Integrated Subsurface Evaluation

C-47F

COMPANY	: Parsons			OTHER SERVICES:	
WELL	: D-47F			None	
LOCATION/FIELD	: None			None	
COUNTY	: None			None	
STATE	: UT				
SECTION	: None	TOWNSHIP	: None	RANGE	: None
DATE	: 09/10/05	PERMANENT DATUM	: TOPVC		
DEPTH DRILLER	: 380			KB	: None
LOG BOTTOM	: 373.80	LOG MEASURED FROM:	TOPVC	DF	: None
LOG TOP	: 0.00	DRL MEASURED FROM:	None	GL	: None
CASING DIAMETER	:	LOGGING UNIT	: 202		
CASING TYPE	: PVC	FIELD OFFICE	:		
CASING THICKNESS:	0.2	RECORDED BY	: DM		
BIT SIZE	: 4.5	BOREHOLE FLUID	: 0	FILE	: ORIGINAL
MAGNETIC DECL.	: 0	RM	: 0	TYPE	: 9512A
MATRIX DENSITY	: 2.71	RM TEMPERATURE	: 0		
NEUTRON MATRIX	: Dolomite	MATRIX DELTA T	: 54		
				THRESH:	2500

12385935E
4486529N

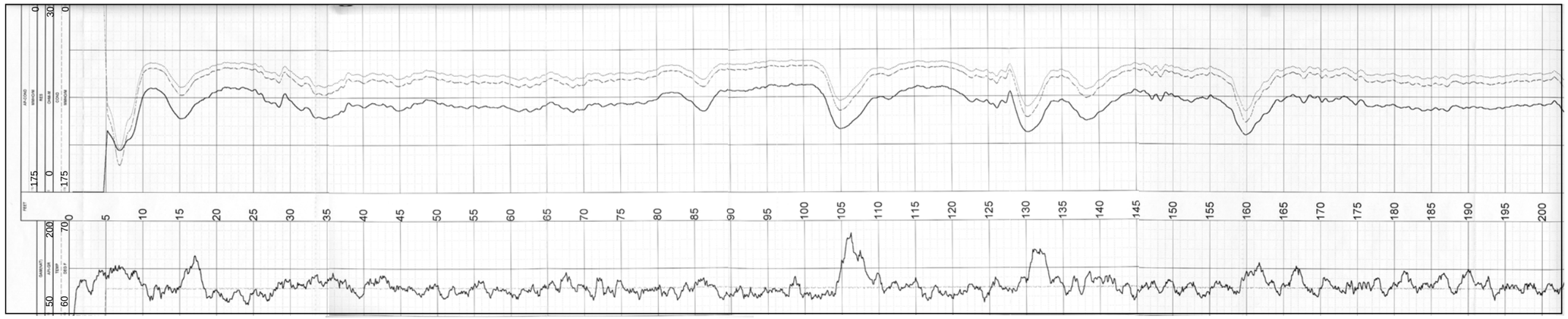
SLC6Q017.ppt

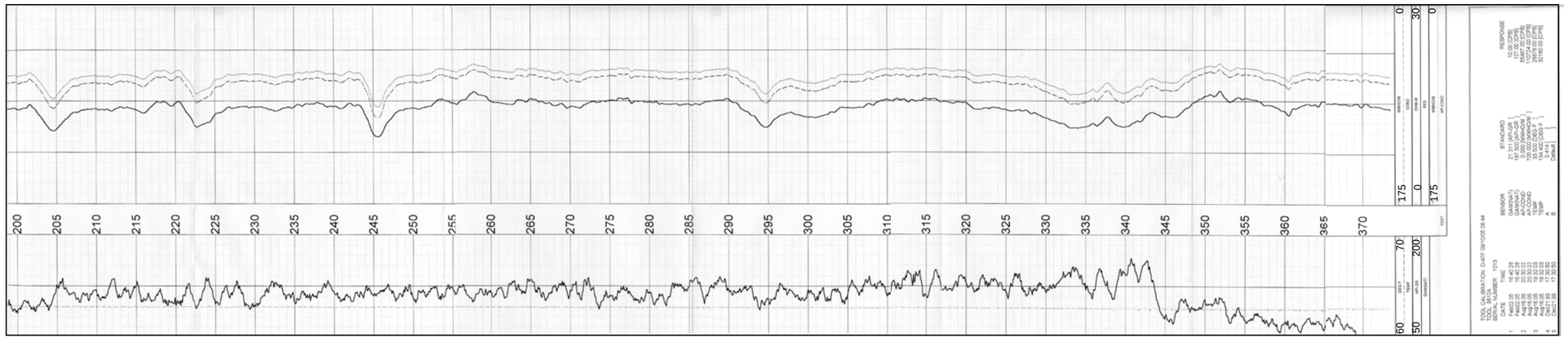
KLEINFELDER
PARSONS
Date:01/18/2006
Project Number 48743.1B

TEAD Phase II RFI

WELL C-47F
NATURAL GAMMA AND
INDUCTION ELECTRICAL LOGS

PLATE
C-2a





SLC5Q276.ppt

KLEINFELDER
PARSONS

Date: 12/09/2005
Project Number 48743.1B

TEAD Phase II RFI

WELL C-47F
NATURAL GAMMA AND INDUCTION LOGS

PLATE
C-2b

RAS
Integrated Subsurface Evaluation
311 Rock Avenue • Golden, CO 80401
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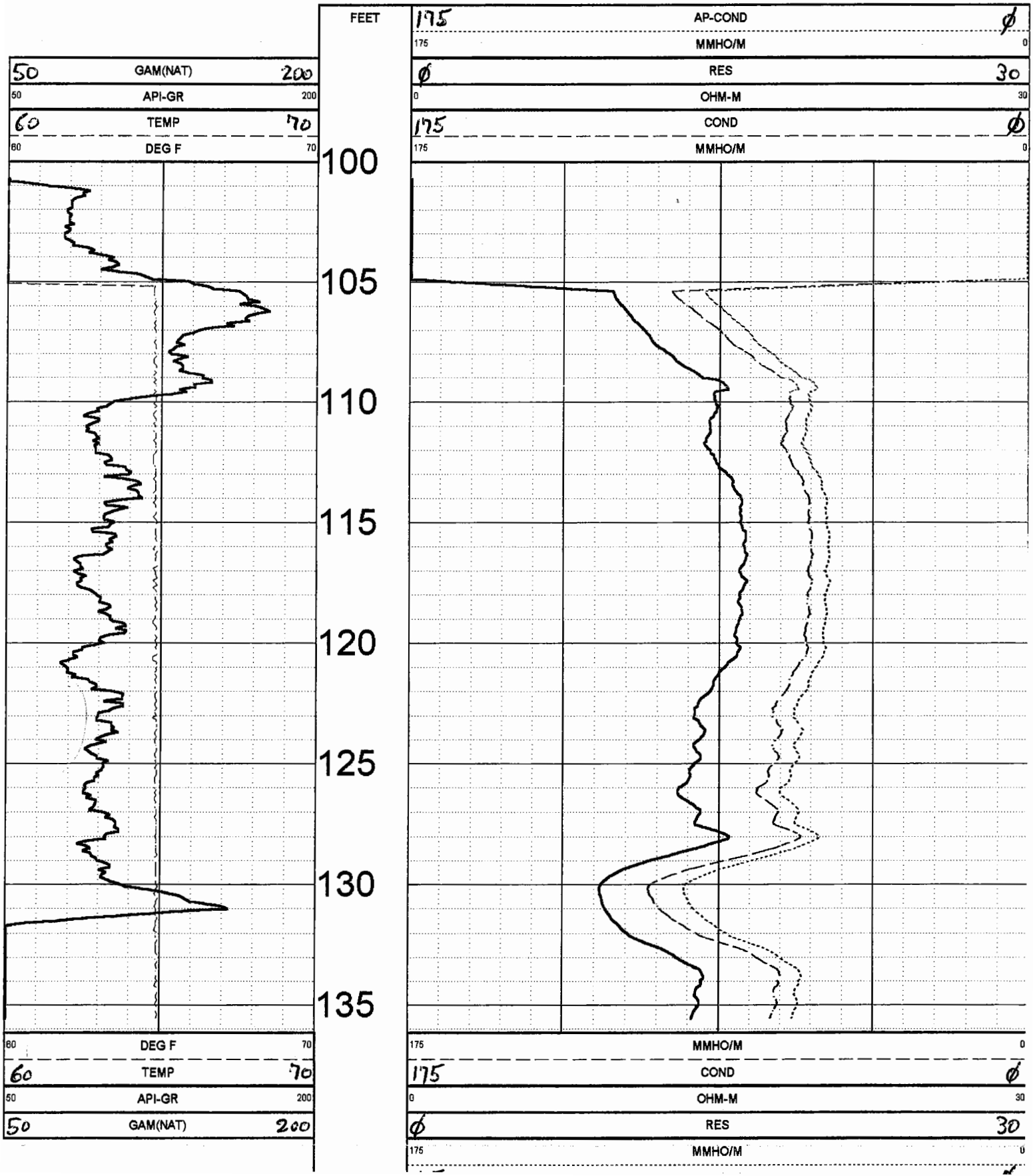
email: PedlerRAS@aol.com • www.rasinc.org

CB-47F
Repeat

C-47F REPEAT SECTION



FEET	175	AP-COND	ø

TOOL CALIBRATION D-47F-Rpt 09/10/05 09:17
TOOL 9512A
SERIAL NUMBER 1013

	DATE	TIME	SENSOR	STANDARD	RESPONSE
1	Feb02,05	16:40:28	GAM(NAT)	21.311 [API-GR]	10.00 [CPS]
	Feb02,05	16:40:28	GAM(NAT)	187.500 [API-GR]	127.00 [CPS]
2	Aug16,05	20:30:22	AP-COND	0.000 [MMHO/M]	55467.00 [CPS]
	Aug16,05	20:30:22	AP-COND	705.000 [MMHO/M]	110724.00 [CPS]
3	Aug16,05	19:32:03	TEMP	33.500 [DEG F]	26878.00 [CPS]
	Aug16,05	19:32:03	TEMP	134.400 [DEG F]	32180.00 [CPS]
4	Dec21,99	17:30:50	A	0.414 [ ]	
5	Dec21,99	17:30:50	B	Default [ ]	

311 Rock Avenue • Golden, CO 80401
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email: PedlerRAS@aol.com • www.rasinc.org

Integrated Subsurface Evaluation

C-47F

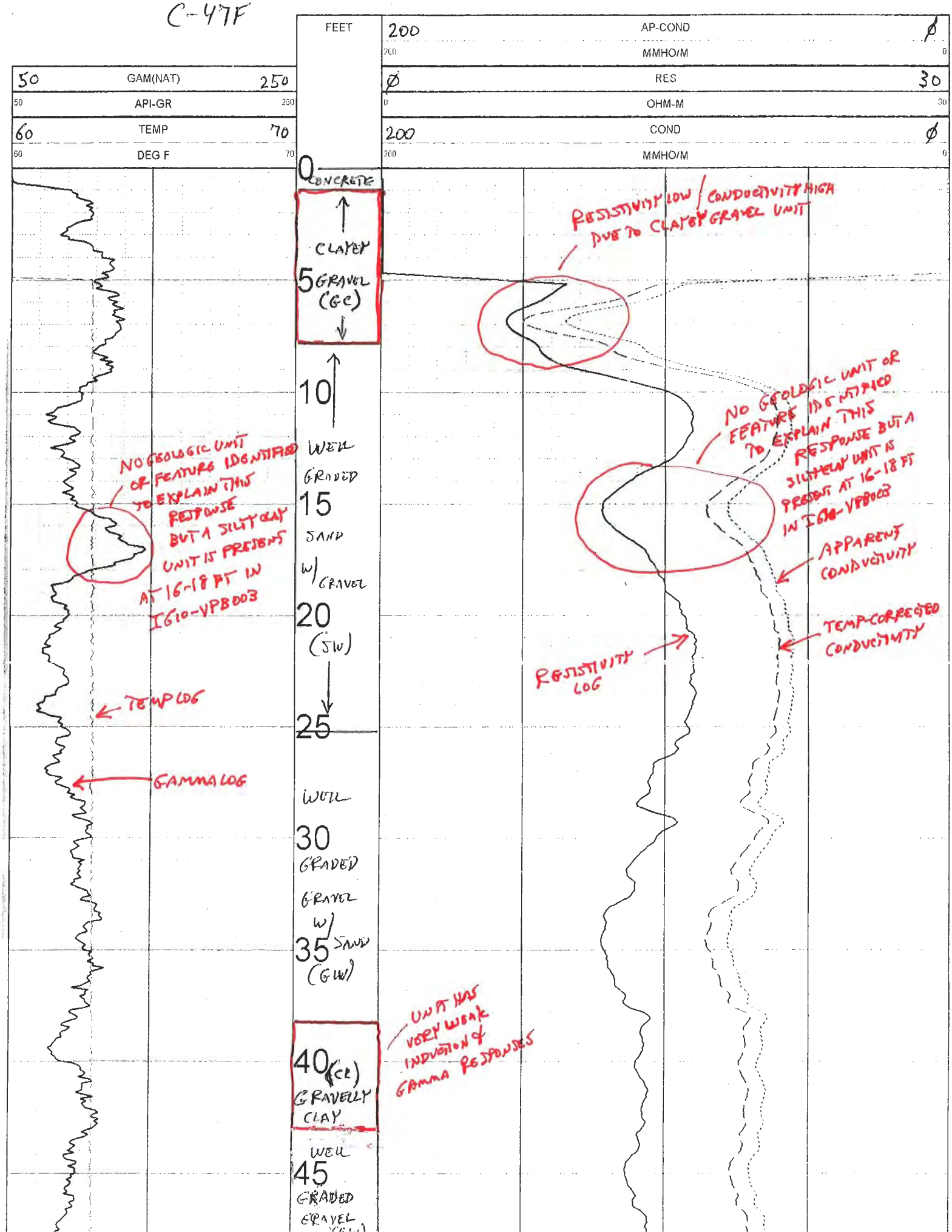
COMPANY	: Parsons			OTHER SERVICES:	
WELL	: D-47F C-47F			None	
LOCATION/FIELD	: None			None	
COUNTY	: None			None	
STATE	: UT				
SECTION	: None	TOWNSHIP	: None	RANGE	: None
DATE	: 09/10/05	PERMANENT DATUM	: TOPVC		
DEPTH DRILLER	: 380			KB	: None
LOG BOTTOM	: 373.80	LOG MEASURED FROM.	TOPVC	DF	None
LOG TOP	: 0.50	DRL MEASURED FROM:	None	GL	: None
CASING DIAMETER	:	LOGGING UNIT	: 202		
CASING TYPE	: PVC	FIELD OFFICE	:		
CASING THICKNESS:	0.2	RECORDED BY	: DM		
BIT SIZE	: 4.5	BOREHOLE FLUID	: 0	FILE	: ORIGINAL
MAGNETIC DECL.	: 0	RM	: 0	TYPE	: 9512A
MATRIX DENSITY	: 2.71	RM TEMPERATURE	: 0		
NEUTRON MATRIX	: Dolomite	MATRIX DELTA T	: 54		
				THRESH:	2500

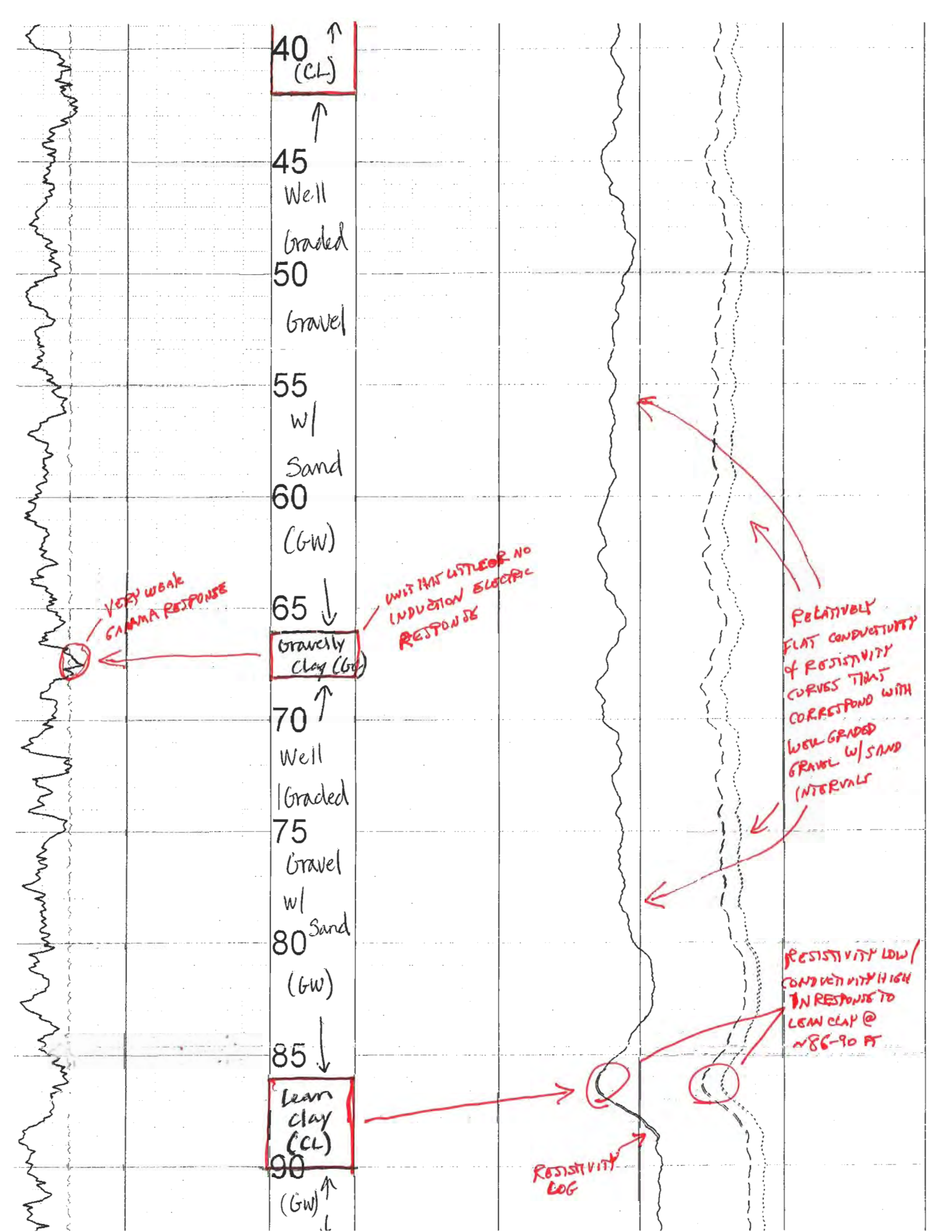
12385935E
4486529N

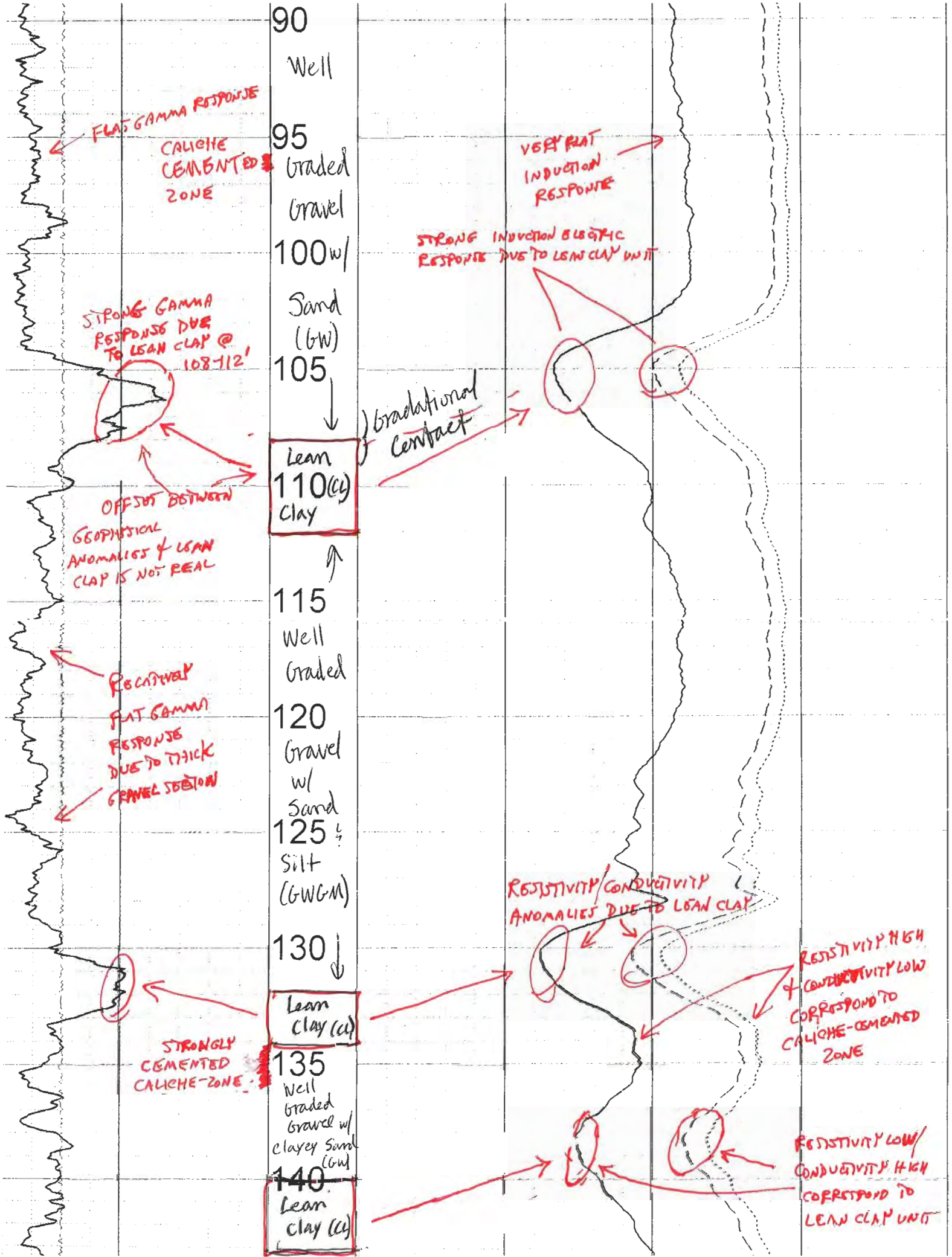
INTERPRETATION OF DOWNHOLE GEOPHYSICAL LOGS

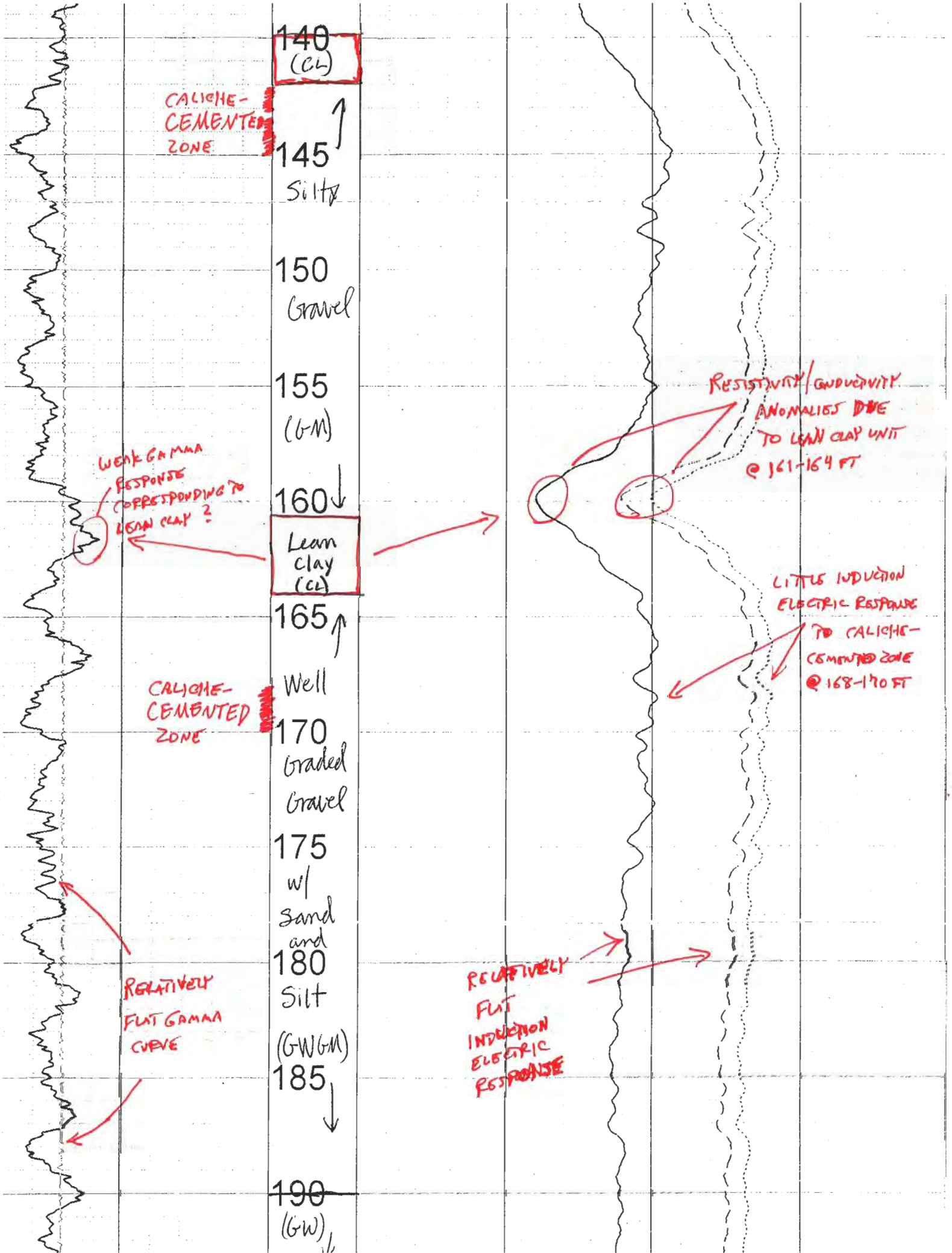
BOREHOLE GEOLOGY FROM GEOLOGIC BORING LOG OF WELL C-47F (BY MATTIVERS).

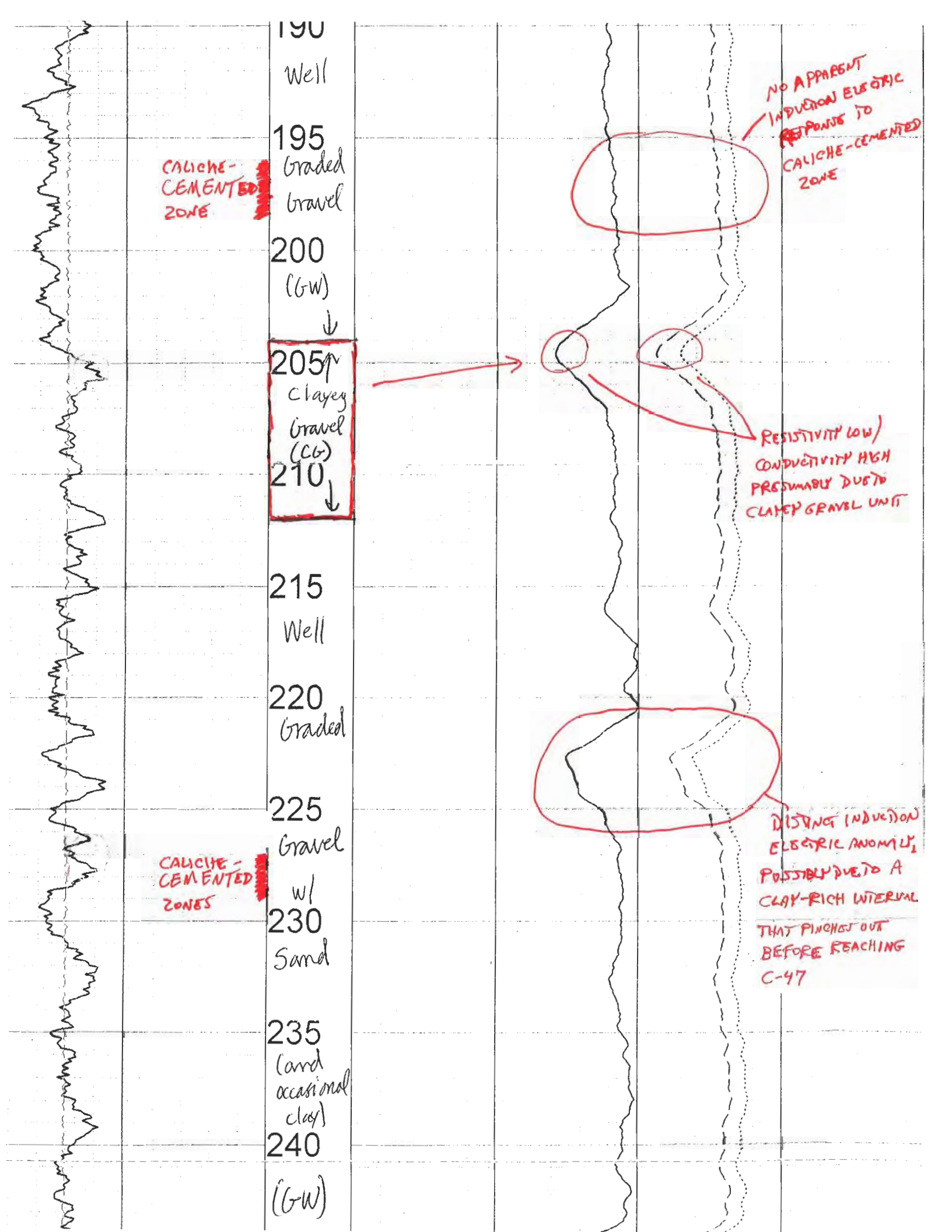
C-47F

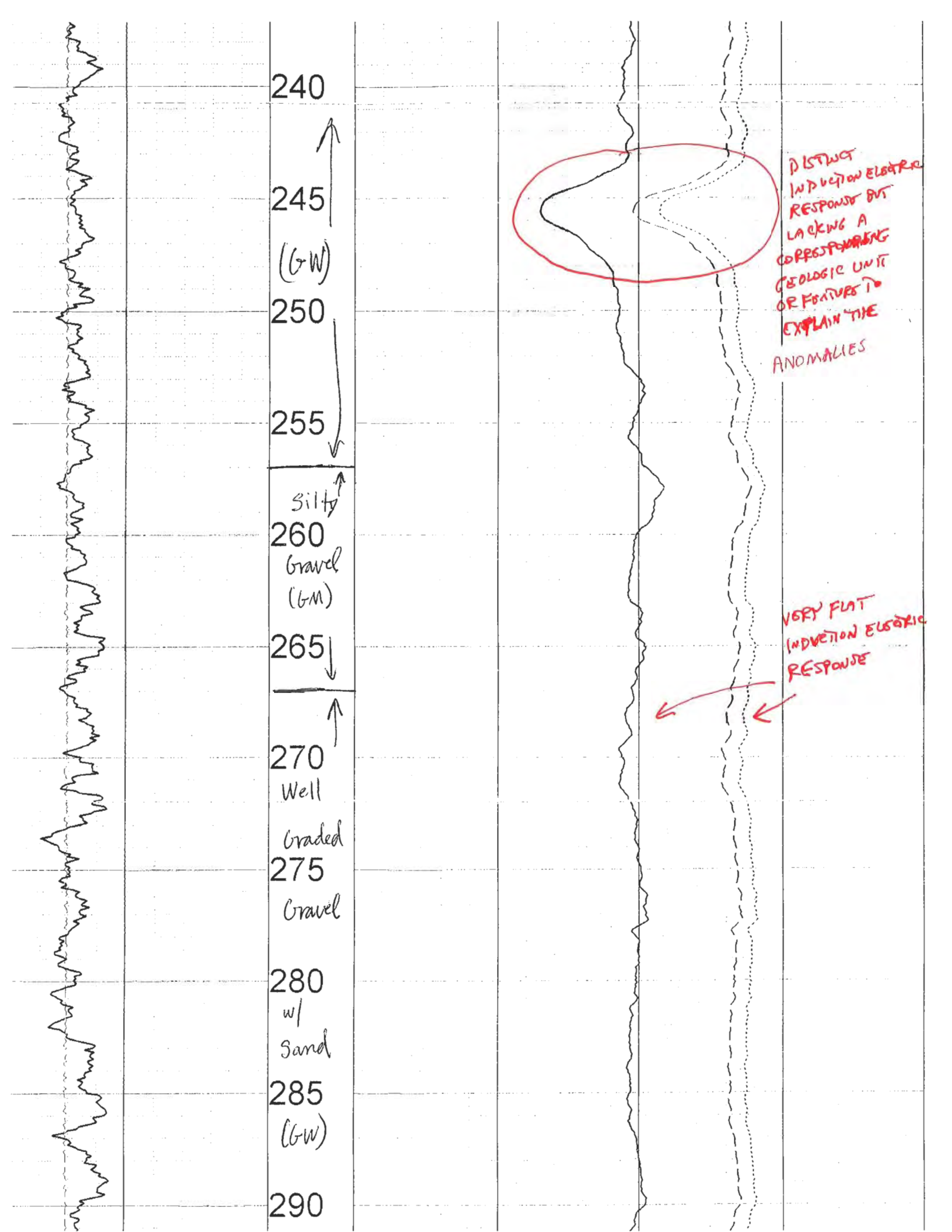

FEET
50 GAM(NAT) 250
50 API-GR 250
60 TEMP 70
60 DEG F 70
200 AP-COND 0
200 MMHO/M 0
0 RES 30
0 OHM-M 30
200 COND 0
200 MMHO/M 0
0 CONCRETE
CLAYEY
5 GRAVEL (GC)
10
WELL GRADED
15 SAND
W/ GRAVEL
20 (SW)
25
WELL
30 GRADED
GRAVEL
W/
35 SAND
(GW)
40 (CL)
GRAVELLY
CLAY
WELL
45 GRADED
GRAVEL
RESISTIVITY LOW / CONDUCTIVITY HIGH DUE TO CLAYEY GRAVEL UNIT
NO GEOLOGIC UNIT OR FEATURE IDENTIFIED TO EXPLAIN THIS RESPONSE BUT A SILTY CLAY UNIT IS PRESENT AT 16-18 FT IN I610-VPB003
NO GEOLOGIC UNIT OR FEATURE IDENTIFIED TO EXPLAIN THIS RESPONSE BUT A SILTY/CLAY UNIT IS PRESENT AT 16-18 FT IN I610-VPB003
APPARENT CONDUCTIVITY
TEMP-CORRECTED CONDUCTIVITY
RESISTIVITY LOG
TEMP LOG
GAMMA LOG
UNIT HAS VERY WEAK INDUCTION & GAMMA RESPONSES

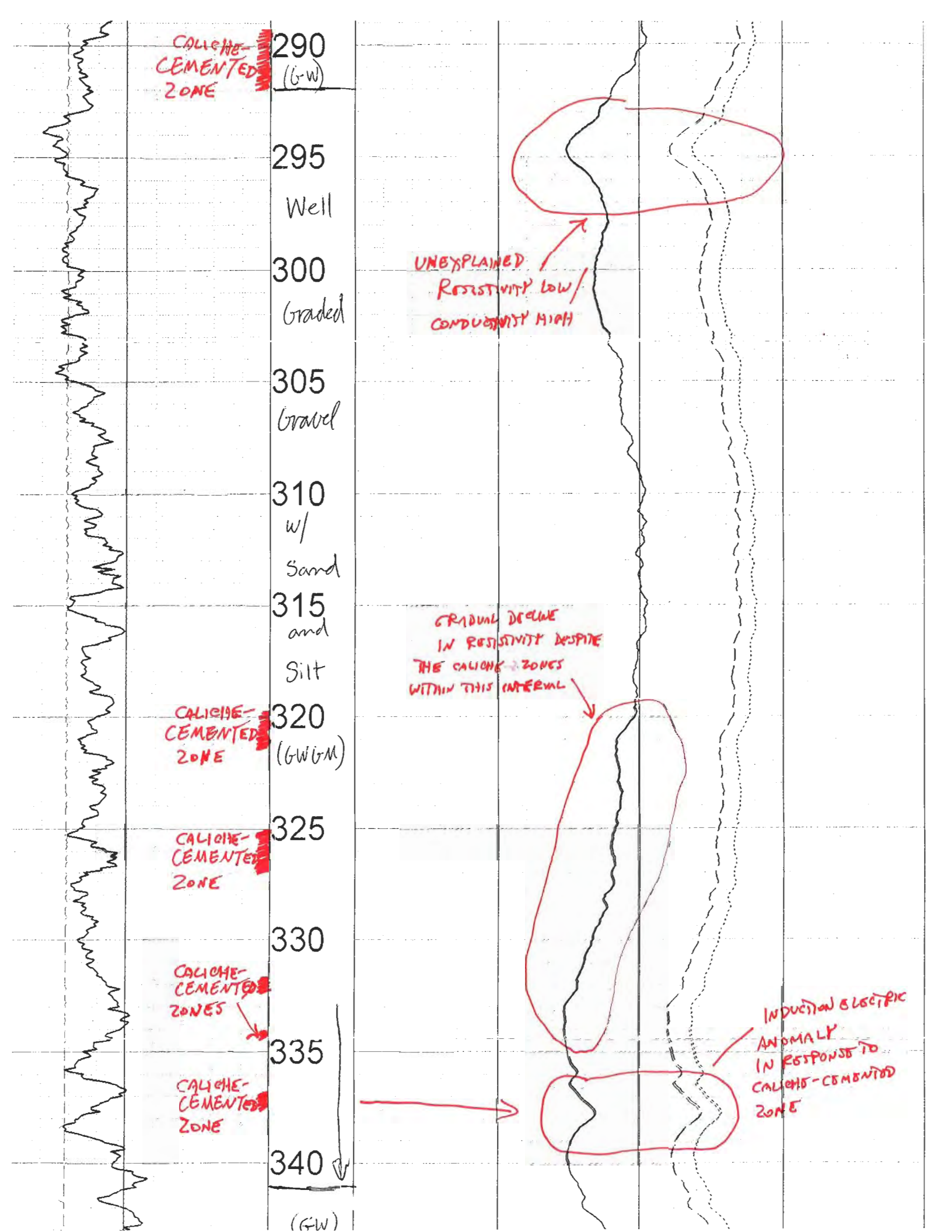

40
(CL)
45
Well
Graded
50
Gravel
55
w/
Sand
60
(GW)
65
Gravelly
Clay (GC)
70
Well
Graded
75
Gravel
w/
80
Sand
(GW)
85
Lean
clay
(CL)
90
(GW)
VERY WEAK GAMMA RESPONSE
UNIT HAS LITTLE OR NO INDUCTION ELECTRIC RESPONSE
RELATIVELY FLAT CONDUCTIVITY & RESISTIVITY CURVES THAT CORRESPOND WITH WELL-GRADED GRAVEL W/ SAND INTERVALS
RESISTIVITY LOW / CONDUCTIVITY HIGH IN RESPONSE TO LEAN CLAY @ ~86-90 FT
RESISTIVITY LOG

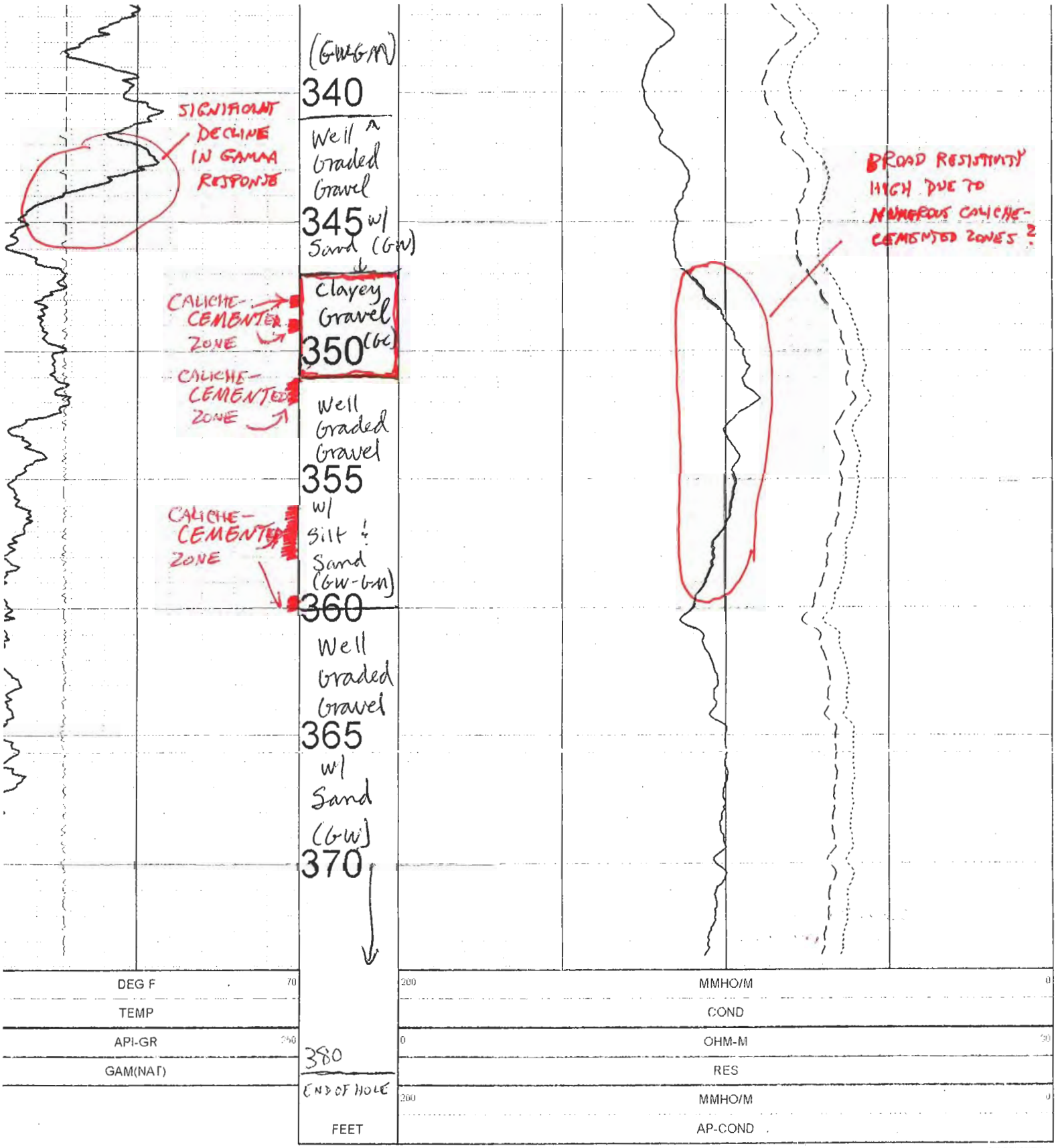

90
Well
95
Graded
Gravel
100 w/
Sand
(GW)
105
Lean
110 (CL)
Clay
115
Well
Graded
120
Gravel
w/
Sand
125
Silt
(GWGM)
130
Lean
Clay (CL)
135
Well
Graded Gravel w/
clayey Sand
(GW)
140
Lean
Clay (CL)
FLAT GAMMA RESPONSE
CALICHE CEMENTED ZONE
STRONG GAMMA RESPONSE DUE TO LEAN CLAY @ 108-112'
OFFSET BETWEEN GEOPHYSICAL ANOMALIES & LEAN CLAY IS NOT REAL
RECTANGULAR FLAT GAMMA RESPONSE DUE TO THICK GRAVEL SECTION
STRONGLY CEMENTED CALICHE-ZONE
VERY FLAT INDUCTION RESPONSE
STRONG INDUCTION ELECTRIC RESPONSE DUE TO LEAN CLAY UNIT
Gradational Contact
RESISTIVITY/CONDUCTIVITY ANOMALIES DUE TO LEAN CLAY
RESISTIVITY HIGH & CONDUCTIVITY LOW CORRESPOND TO CALICHE-CEMENTED ZONE
RESISTIVITY LOW/ CONDUCTIVITY HIGH CORRESPOND TO LEAN CLAY UNIT


140
(CL)
CALICHE-CEMENTED ZONE
145
Silty
150
Gravel
155
(GM)
160
Lean clay (CL)
165
Well
CALICHE-CEMENTED ZONE
170
Graded Gravel
175
w/ Sand and
180
Silt
(GW GM)
185
190
(GW)
WEAK GAMMA RESPONSE CORRESPONDING TO LEAN CLAY ?
RELATIVELY FLAT GAMMA CURVE
RESISTIVITY/CONDUCTIVITY ANOMALIES DUE TO LEAN CLAY UNIT @ 161-164 FT
LITTLE INDUCTION ELECTRIC RESPONSE TO CALICHE-CEMENTED ZONE @ 168-170 FT
RELATIVELY FLAT INDUCTION ELECTRIC RESPONSE


190
Well
195
Graded
Gravel
CALICHE-CEMENTED ZONE
200
(GW)
205
Clayey
Gravel
(CG)
210
215
Well
220
Graded
225
Gravel
w/
230
Sand
CALICHE-CEMENTED ZONES
235
(and occasional clay)
240
(GW)
NO APPARENT INDUCTION ELECTRIC RESPONSE TO CALICHE-CEMENTED ZONE
RESISTIVITY LOW/ CONDUCTIVITY HIGH PRESUMABLY DUE TO CLAYEY GRAVEL UNIT
DISTINCT INDUCTION ELECTRIC ANOMALY, POSSIBLY DUE TO A CLAY-RICH INTERVAL THAT PINCHES OUT BEFORE REACHING C-47


240
245
(GW)
250
255
Silty
260
Gravel
(GM)
265
270
Well
Graded
275
Gravel
280
w/
Sand
285
(GW)
290
DISTINCT INDUCTION ELECTRIC RESPONSE BUT LACKING A CORRESPONDING GEOLOGIC UNIT OR FEATURE TO EXPLAIN THE ANOMALIES
VERY FLAT INDUCTION ELECTRIC RESPONSE


CALICHE-CEMENTED ZONE
290
(GW)
295
Well
300
Graded
305
Gravel
310
w/
Sand
315
and
Silt
320
(GW/GM)
325
330
335
340
(GW)
CALICHE-CEMENTED ZONE
CALICHE-CEMENTED ZONE
CALICHE-CEMENTED ZONES
CALICHE-CEMENTED ZONE
UNEXPLAINED RESISTIVITY LOW / CONDUCTIVITY HIGH
GRADUAL DECLINE IN RESISTIVITY DESPITE THE CALICHE ZONES WITHIN THIS INTERVAL
INDUCTION ELECTRIC ANOMALY IN RESPONSE TO CALICHE-CEMENTED ZONE



TOOL CALIBRATION D-47F 09/10/05 08:44
TOOL 9512A
SERIAL NUMBER 1013

DATE	TIME	SENSOR	STANDARD	RESPONSE
Feb02,05	16:40:28	GAM(NAT)	21.311 [API-GR]	10.00 [CPS]
Feb02,05	16:40:28	GAM(NAT)	187.500 [API-GR]	127.00 [CPS]
Aug16,05	20:30:22	AP-COND	0.000 [MMHO/M]	55467.00 [CPS]
Aug16,05	20:30:22	AP-COND	705.000 [MMHO/M]	110724.00 [CPS]
Aug16,05	19:32:03	TEMP	33.500 [DEG F]	26878.00 [CPS]

311 Rock Avenue • Golden, CO 80401
PH 303.526.4432 • FAX 303.526.4426
email: PedlerRAS@aol.com • www.rasinc.org

Integrated Subsurface Evaluation

C-47F

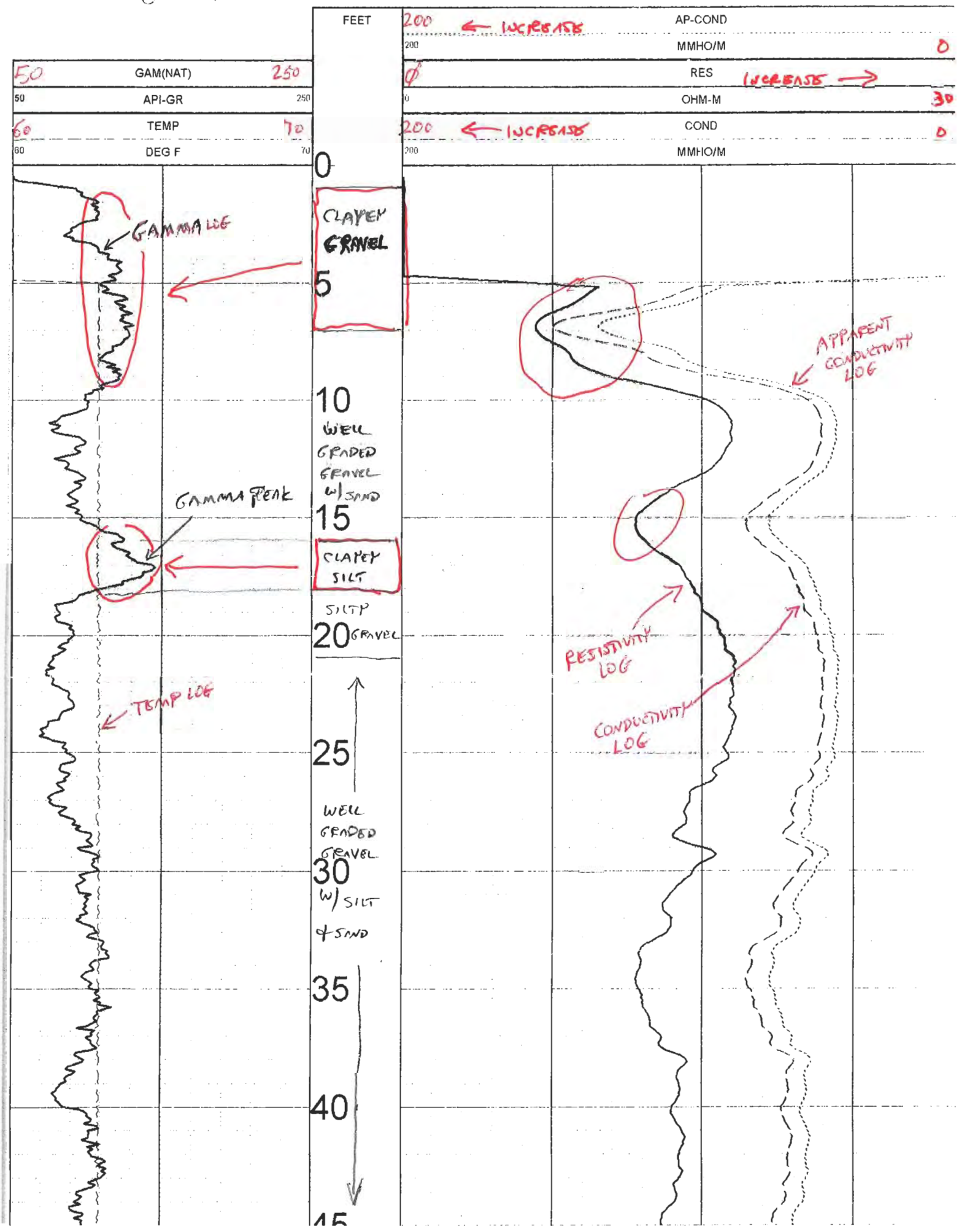
COMPANY	: Parsons			OTHER SERVICES:	
WELL	: ~~D-47F~~ C-47F			None	
LOCATION/FIELD	: None			None	
COUNTY	: None			None	
STATE	: UT				
SECTION	: None	TOWNSHIP	: None	RANGE	: None
DATE	: 09/10/05	PERMANENT DATUM	: TOPVC		
DEPTH DRILLER	: 380			KB	: None
LOG BOTTOM	: 373.80	LOG MEASURED FROM.	TOPVC	DF	None
LOG TOP	: 0.50	DRL MEASURED FROM:	None	GL	: None
CASING DIAMETER	:	LOGGING UNIT	: 202		
CASING TYPE	: PVC	FIELD OFFICE	:		
CASING THICKNESS:	0.2	RECORDED BY	: DM		
BIT SIZE	: 4.5	BOREHOLE FLUID	: 0	FILE	: ORIGINAL
MAGNETIC DECL.	: 0	RM	: 0	TYPE	: 9512A
MATRIX DENSITY	: 2.71	RM TEMPERATURE	: 0		
NEUTRON MATRIX	: Dolomite	MATRIX DELTA T	: 54		
				THRESH:	2500

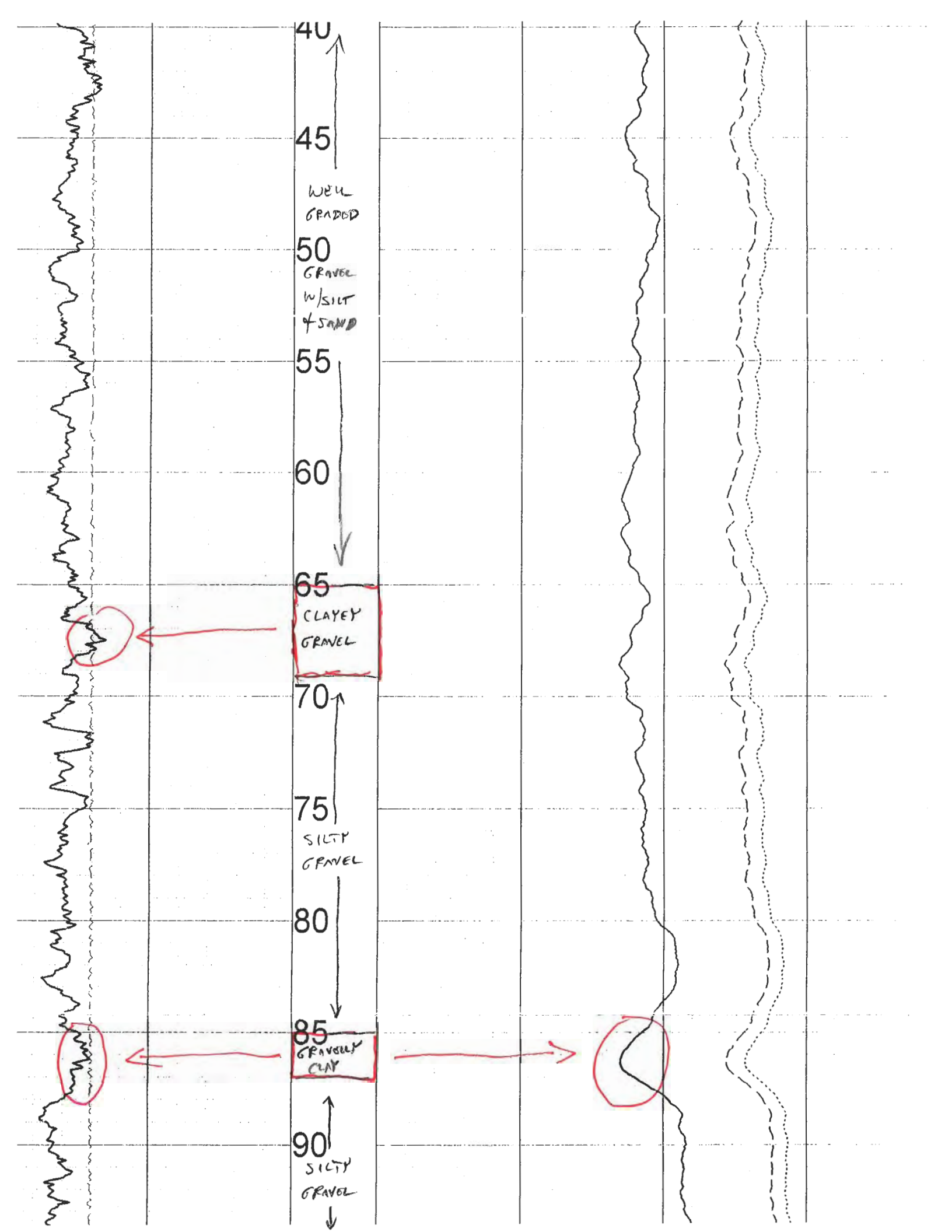
12385935E
4486529N

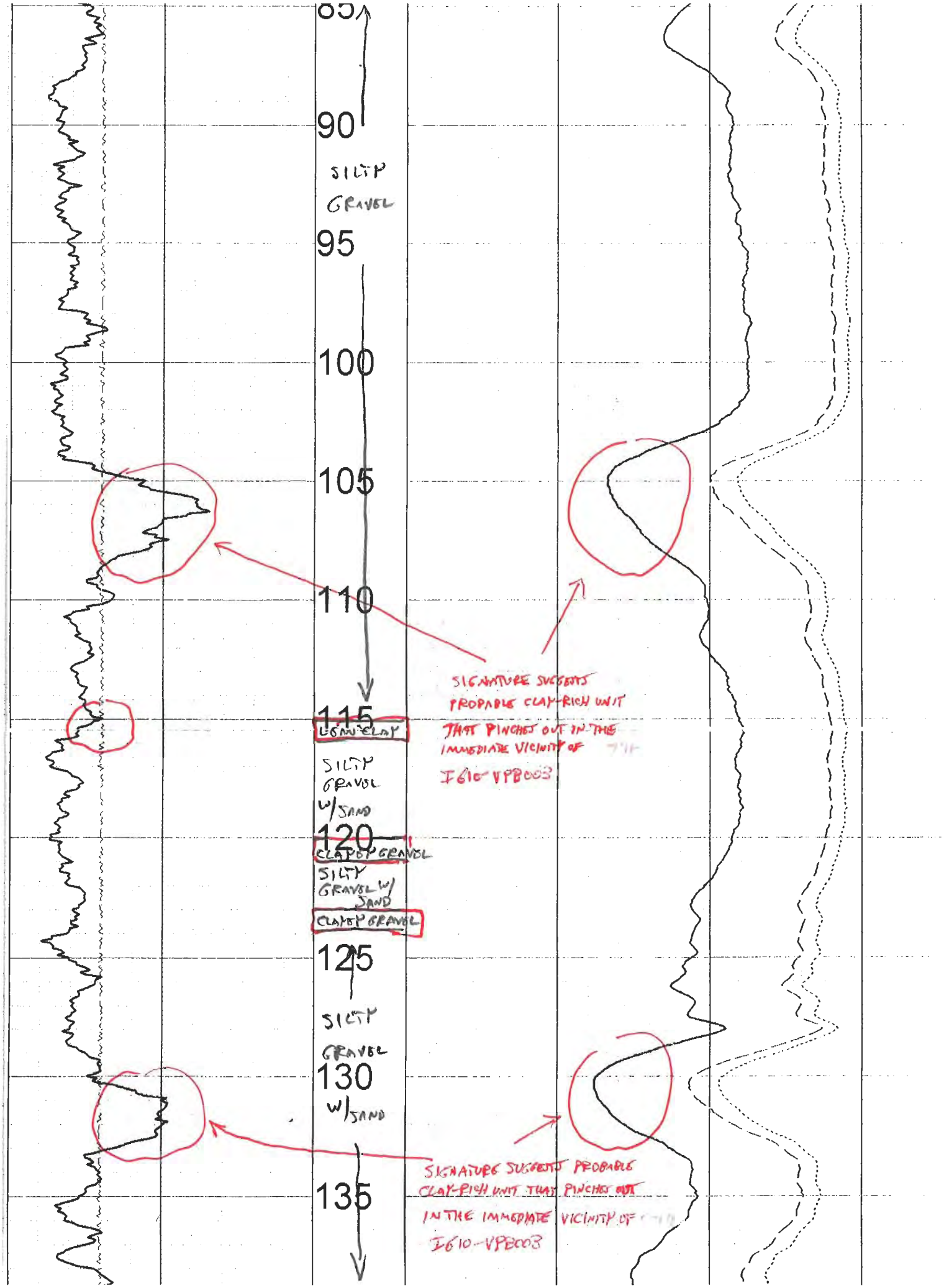
ALL SERVICES PROVIDED SUBJECT TO STANDARD TERMS AND CONDITIONS

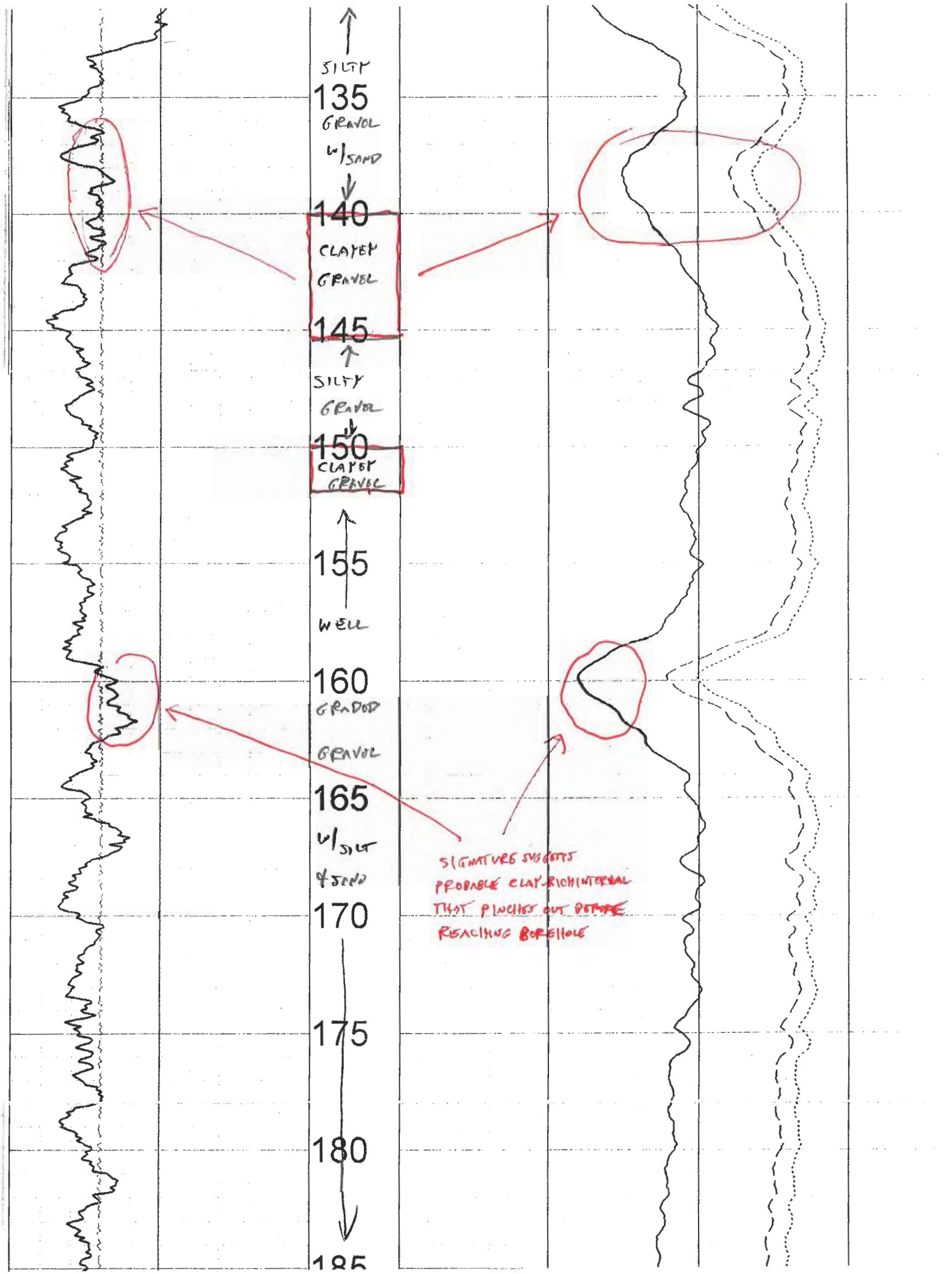
Comparison of downhole geophysical logging conducted in monitoring well C-47F with geologic log from proximal vertical profile boring I610-VPB003 located ~ 35-40 ft away. Note that I610-VPB003 was continuously cored.

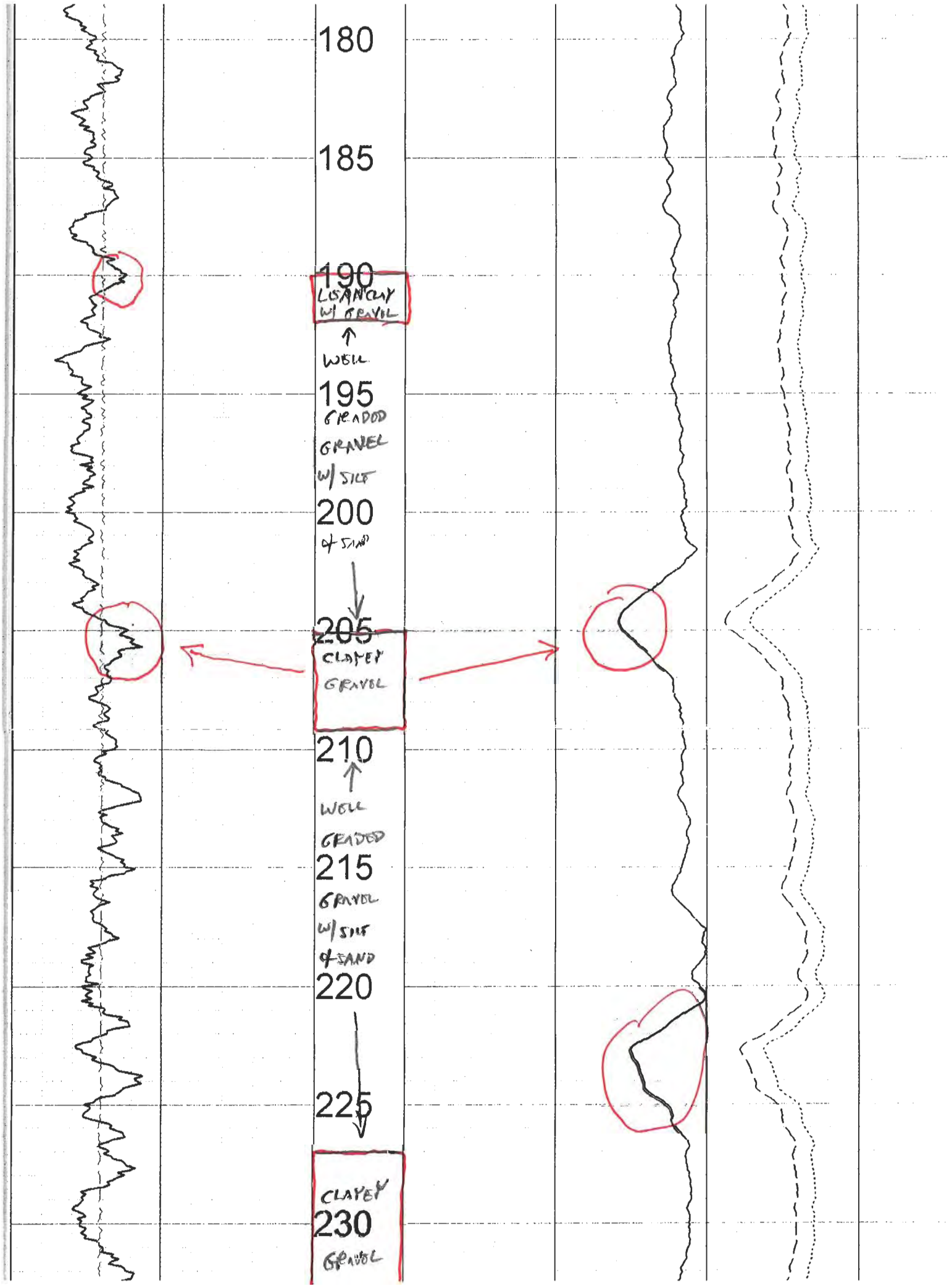
GEOLOGY FROM SONIC BORING I610-VPB003

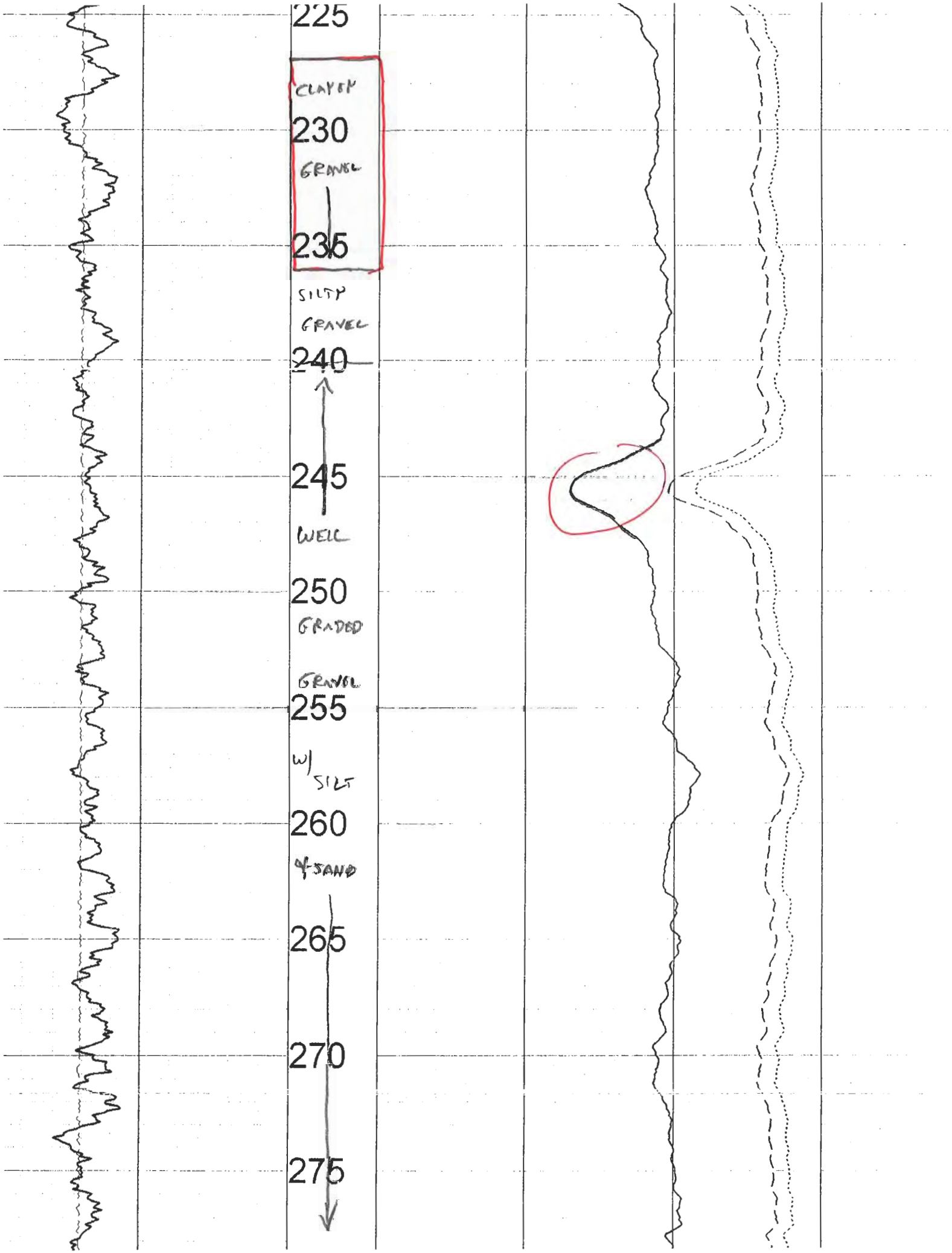



40
45
WELL GRADED
50
GRAVEL W/SILT & SAND
55
60
65
CLAYEY GRAVEL
70
75
SILTY GRAVEL
80
85
GRAVELLY CLAY
90
SILTY GRAVEL


90
SILTY GRAVEL
95
100
105
110
115
LEAN CLAY
SILTY GRAVEL W/ SAND
120
CLAYEY GRAVEL
SILTY GRAVEL W/ SAND
CLAYEY GRAVEL
125
SILTY GRAVEL
130
W/ SAND
135
SIGNATURE SUGGESTS PROBABLE CLAY-RICH UNIT THAT PINCHES OUT IN THE IMMEDIATE VICINITY OF I610-VPB003
SIGNATURE SUGGESTS PROBABLE CLAY-RICH UNIT THAT PINCHES OUT IN THE IMMEDIATE VICINITY OF I610-VPB003


SILTY
135
GRAVEL
W/SAND
140
CLAYEY
GRAVEL
145
SILTY
GRAVEL
150
CLAYEY
GRAVEL
155
WELL
160
GRADED
GRAVEL
165
W/SILT
& SAND
170
175
180
185
SIGNATURES SUGGESTS
PROBABLE CLAY-RICH INTERVAL
THAT PINCHES OUT BEFORE
REACHING BOREHOLE


180
185
190
LOAM/CLAY
W/ GRAVEL
WELL
195
GRADED
GRAVEL
W/ SILT
200
& SAND
205
CLAYEY
GRAVEL
210
WELL
GRADED
215
GRAVEL
W/ SILT
& SAND
220
225
CLAYEY
230
GRAVEL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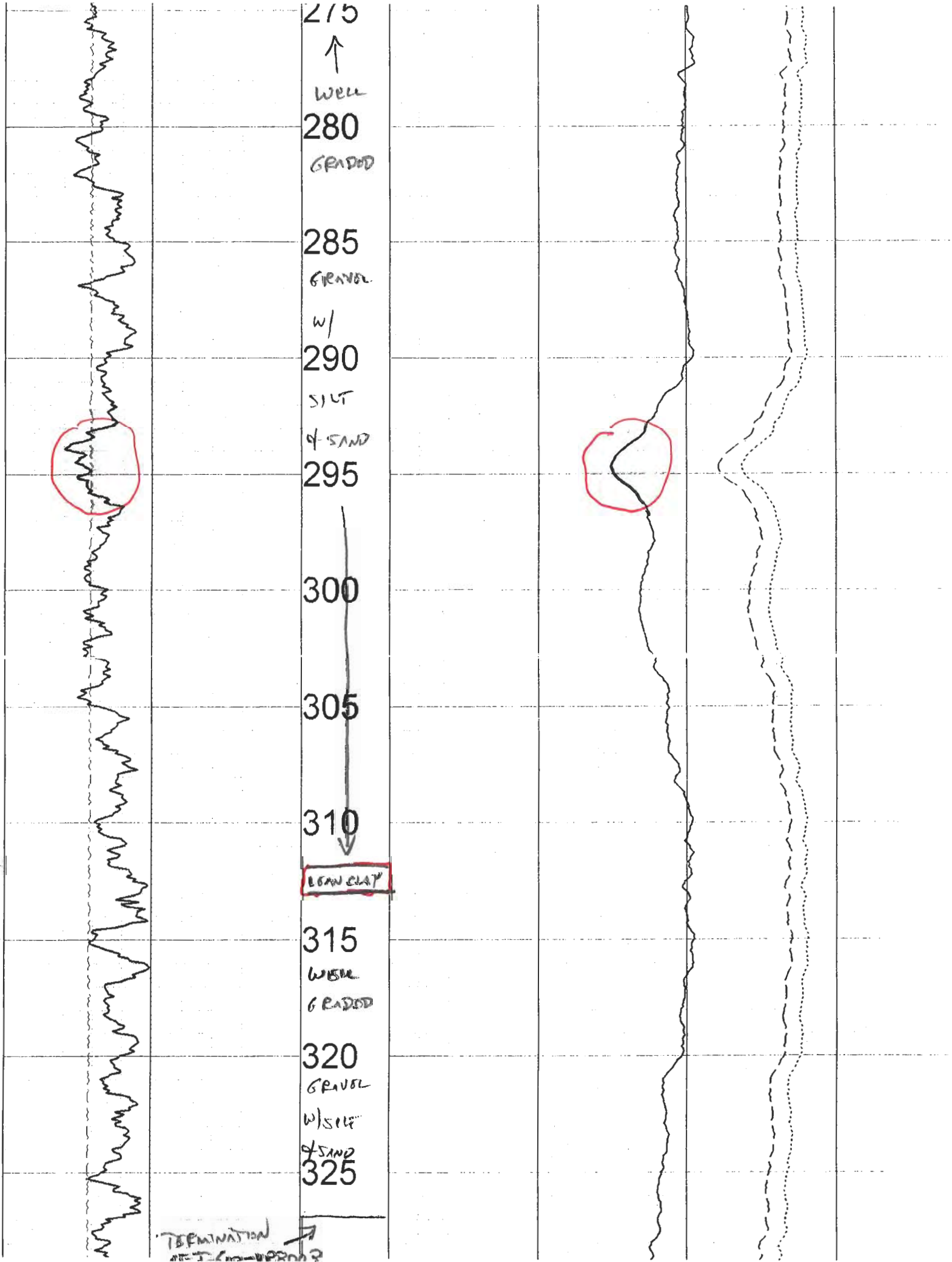
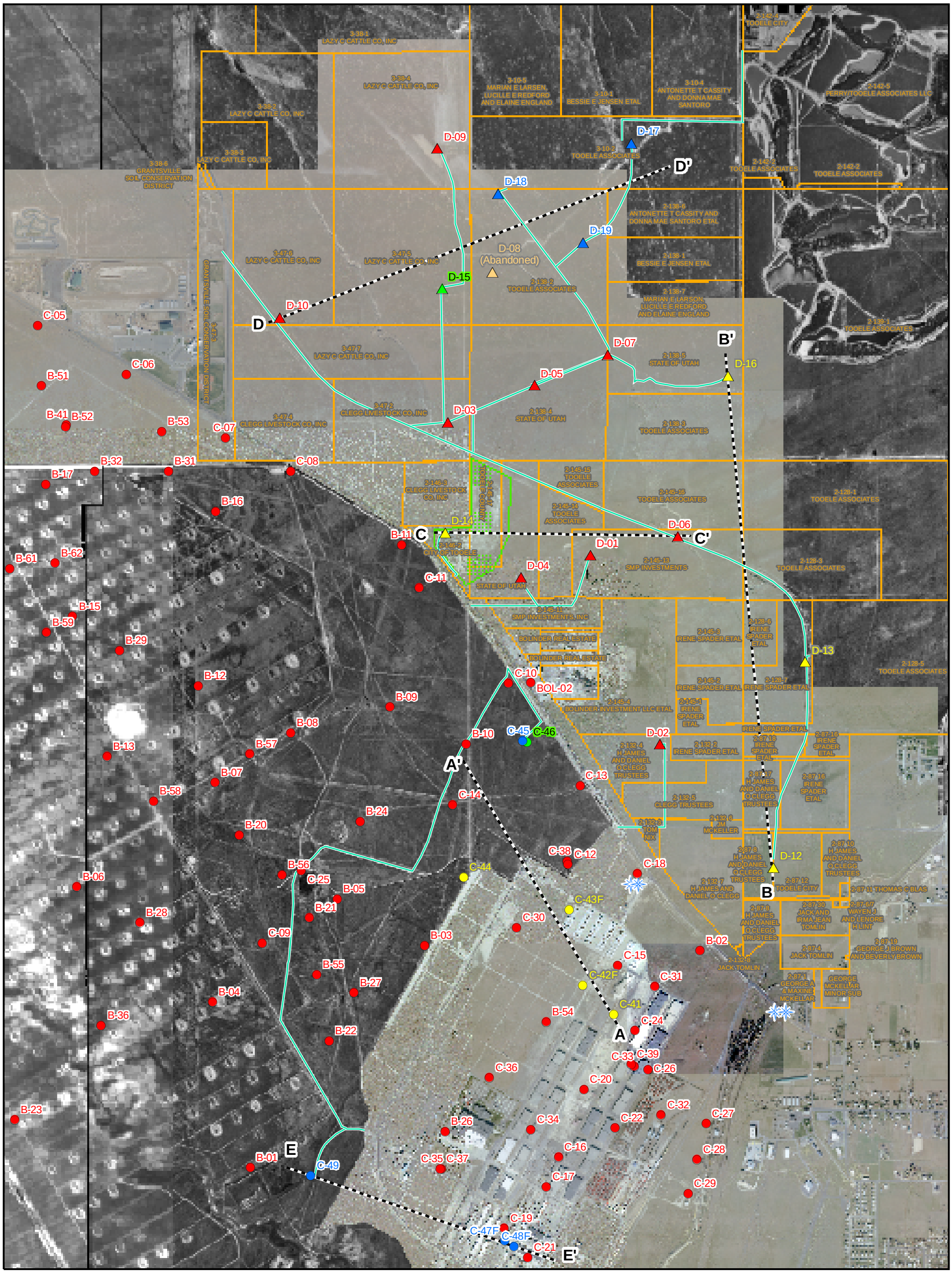
CLAYEY
230
GRAVEL
235
SILTY
GRAVEL
240
245
WELL
250
GRADED
GRAVEL
255
W/ SILT
260
& SAND
265
270
275


275
WELL
280
GRADED
285
GRAVEL
W/
290
SILT
& SAND
295
300
305
310
LEAN CLAY
315
WELL
GRADED
320
GRAVEL
W/SILT
& SAND
325
TERMINATION



LEGEND

Offsite Groundwater Monitoring Wells
- Phase I RFI Well
- Phase I RFI Well - Abandoned
- Phase II RFI - Installed Fall-Winter 2004
- Phase III RFI - Installed Summer 2005
- Proposed Phase II RFI Well

TEAD/UID Groundwater Monitoring Wells
- Existing Well
- Phase II RFI Well - Installed Fall-Winter 2004
- Phase II RFI Well - Installed Summer-Fall 2005
- Proposed Phase II RFI Well

- Survey Benchmark
- Approximate Phase II RFI Well Access Route
- Cross Section Line
- Former Landfill
- Parcel Boundaries / Owners

SWMU 58
PHASE II RFI
TOOELE ARMY DEPOT
TOOELE, UTAH

0 900 1,800
Feet

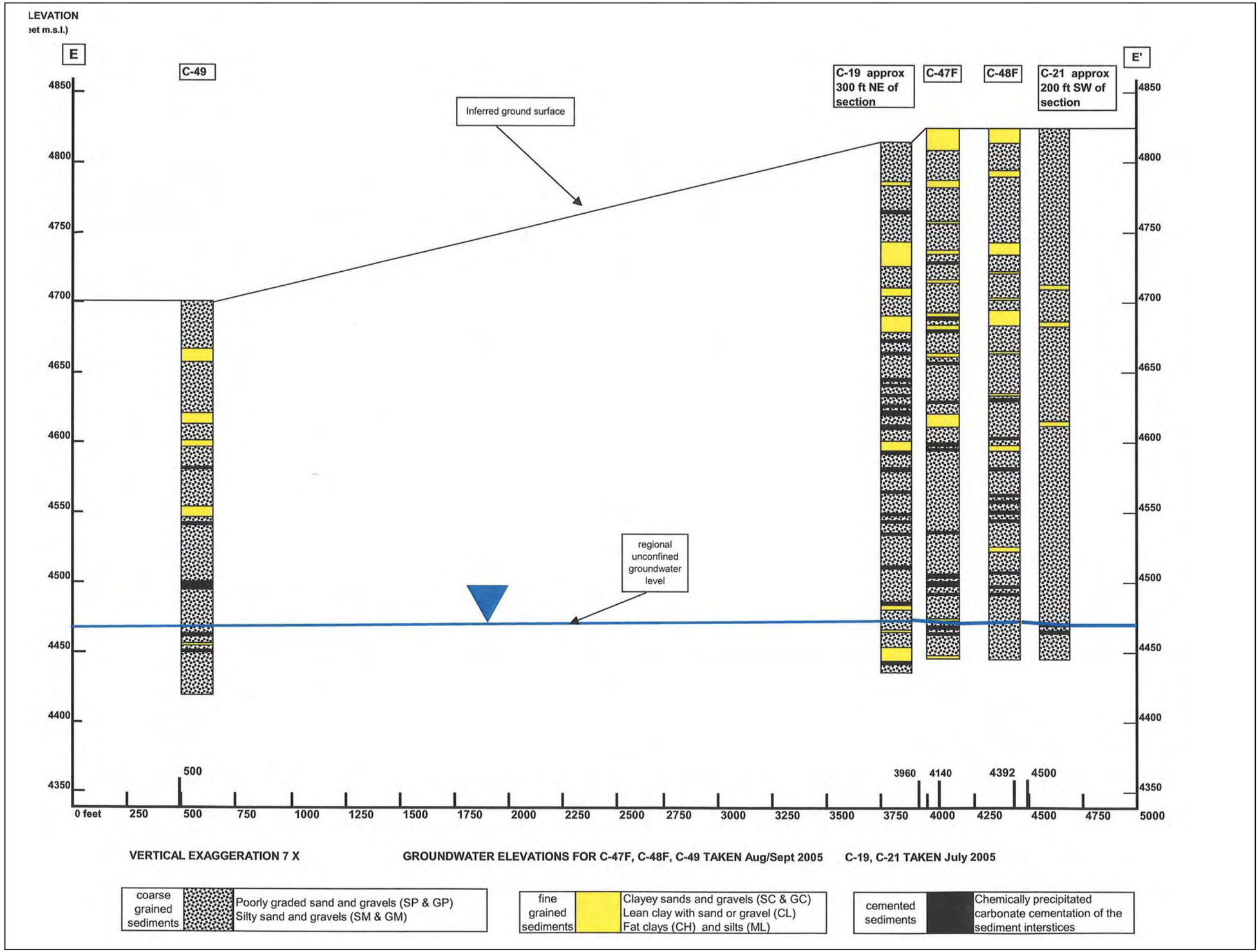
N

PLATE C-3

CROSS SECTION LOCATION DIAGRAM

w:\tooele\maps\well_comp_report_sept2005\cross_section_locations.mxd 01/09/06

PARSONS



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KLEINFELDER
PARSONS

Date: 01/09/2006
Project Number 48743.1B

TEAD Phase II RFI @ SWMU 58

HYDROSTRATIGRAPHIC CROSS SECTION E - E'

PLATE

C-4

APPENDIX D

CONTRACTOR	WELL NUMBER	PLATE
Kleinfelder/Parsons	**C - 47F**	**D-1**

TEAD Phase II RFI - SWMU 58

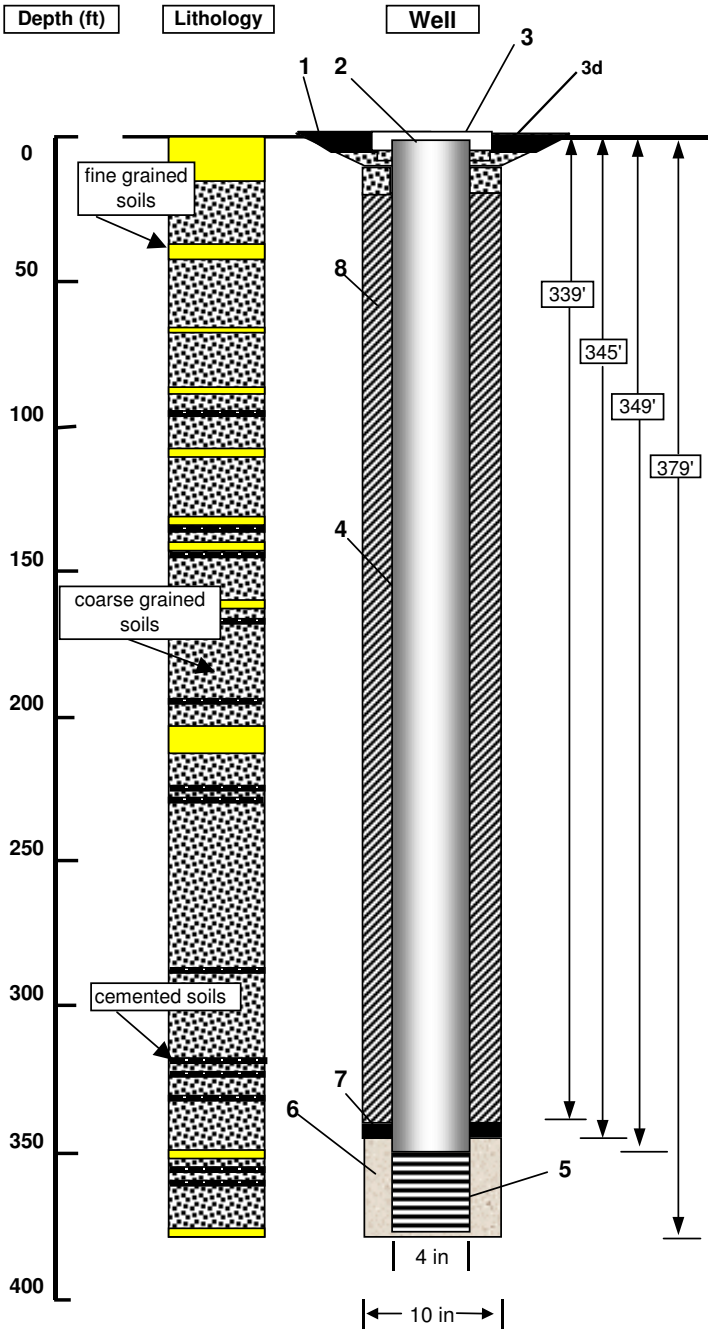
MONITORING WELL INSTALLATION DATA RECORD

PROJECT : **Phase II RFI - SWMU 58** LOCATION : **Tooele County, Utah**

DRILLING SUBCONTRACTOR : **Layne Geoconstruction** DRILLER: **Tom Kearn**

DRILLING METHOD AND EQUIPMENT: **Becker Hammer-Drill Systems AP1000** HELPERS: **Jake Smith**

WATER LEVEL : **354.05 ft (TOC) on 8/15/05** START: **8/5/05** END: **8/10/05** GEOLOGIST **Matt Ivers**



DRAWING NOT TO SCALE

1- Ground elevation at well : 4825.08 feet (brass cap)

2- Measuring point elevation : 4824.53 feet (top of well casing)

3- Surface completion casing :
- a) type / diameter (ID/ OD) : Steel flush mount - 10 inch ID
- b) height above ground : 6 inches - flush with concrete pad
- c) length below ground : 18 inches
- d) type sealant : Portland cement
- e) protective bollards : none

4- Well casing :
- a) type / diameter (ID/ OD) : Schedule 40 PVC / 4 inch
- b) height above ground : top of casing 0.5 feet below ground
- c) length below ground : 379.30 feet
- d) type / quantity of sealant : see # 8
- e) well centralizers : none

5- Well screen :
- a) type / diameter (ID/ OD) : Schedule 40 PVC / 4 inch
- b) slot size : .010 inch
- c) lengths : 3 - 10 foot sections (349 to 379 feet bgs)

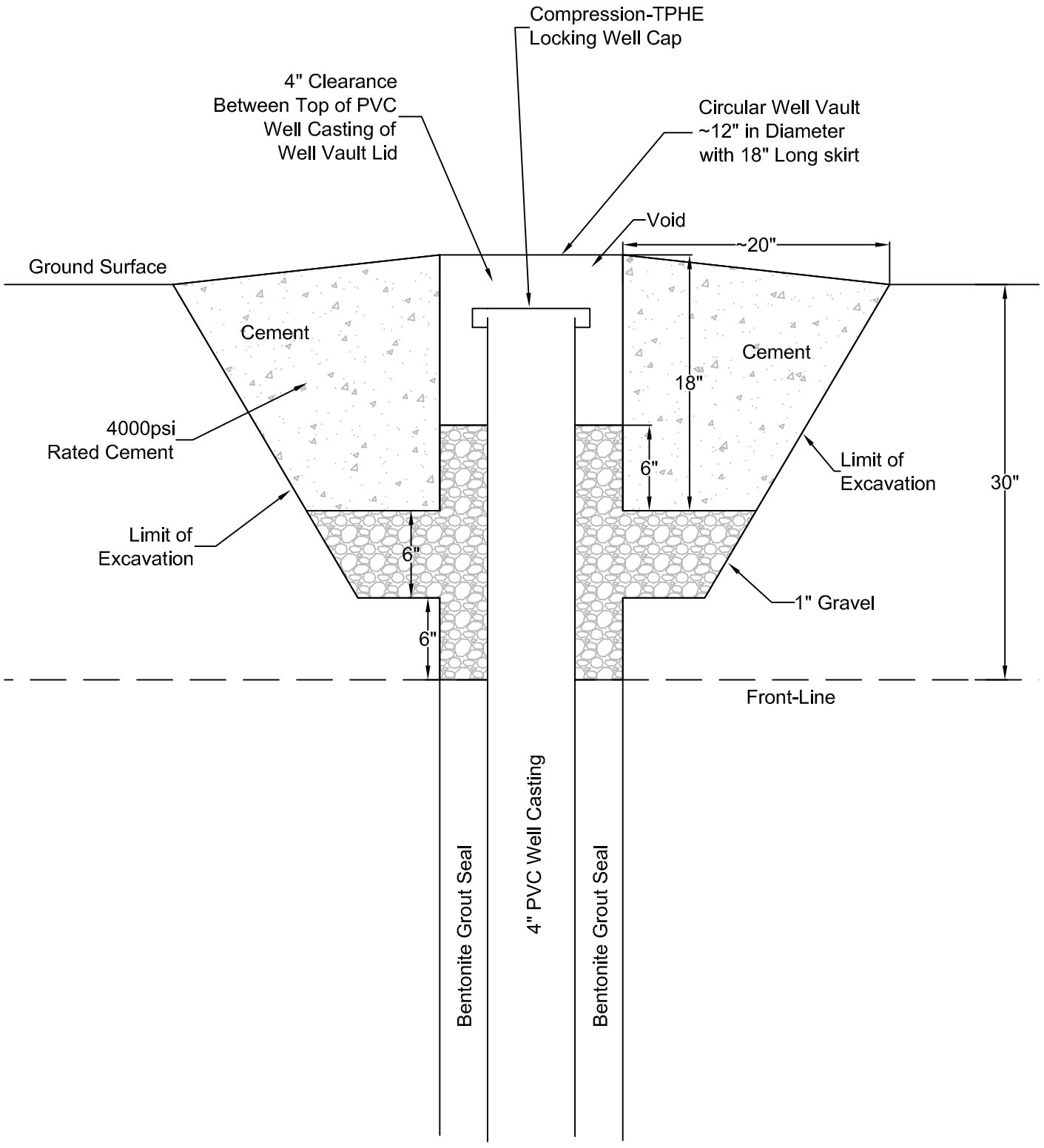
6- Well screen filter pack :
- a) type : #16 / 40 Colorado Silica Sand
- b) quantity used : 26 - 50 lb bags
- c) method of placement : poured from surface
- d) length : 345.0 to 379.3 feet bgs

7- Bentonite seal :
- a) type/quantity : Cetco coated pellets / 2 - 5 gallon buckets
- b) length : 339.3 to 345.0 feet bgs

8- Grout :
- a) grout mix used per batch : 28 gal water to 2 - 50 lb bags bentonite grout
- b) method of placement : pumped from surface
- c) qty of well casing grout : 84 bags (approx 1176 gallons)

Well development :
- a) method : bail and swab / pump and back-flush
- b) time : 2 hour 59 minutes / 4 hours 12 minutes

Pumping tests :
- a) drawdown / time : 0.1 feet / 26 minutes
- b) pumping rate : 2.01 to 2.3 gpm



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KLEINFELDER

Date: 01/16/2006
Project Number 48743.1B

TEAD Phase II RFI @ SWMU 58

FLUSH MOUNT SURFACE COMPLETION
MONITORING WELLS C-47F & C-48F

FIGURE

D-2

SUMMARY OF WELL SURVEY DATA
TEAD Phase II RFI Groundwater Monitoring Wells

Well No.	Elevations (ft above MSL) Measuring Point	Brass Cap	Ground Surface	Top of Well Screen	Bottom of Well Screen	Coordinates for Measuring Point Northing	Coordinates for Measuring Point Easting	Section	Range	Township	PVC Riser Stickup
C-41	**4804.70**	**4802.32**	**4801.67**	**4445.68**	**4425.68**	**7364933.324**	**1406930.413**	30	R 4 W	T 3 S	3.03
C-42F	**4785.09**	**4785.52**	**4785.27**	**4445.27**	**4425.27**	**7365504.752**	**1406335.618**	19	R 4 W	T 3 S	-0.18
C-43F	**4754.87**	**4755.23**	**4755.21**	**4436.21**	**4416.21**	**7366968.52**	**1406061.58**	19	R 4 W	T 3 S	-0.34
C-44	**4722.81**	**4720.44**	**4719.82**	**4439.82**	**4419.82**	**7367591.88**	**1404021.61**	24	R 5 W	T 3 S	2.99
C-45	**4689.99**	**4687.78**	**4687.20**	**4438.20**	**4418.20**	**7370229.15**	**1405164.18**	19	R 4 W	T 3 S	2.79
C-47F	**4824.53**	**4825.08**	**4825.03**	**4476.08**	**4446.08**	**7360556.94**	**1404815.63**	30	R 4 W	T 3 S	-0.50
C-48F	**4823.67**	**4824.08**	**4824.03**	**4475.08**	**4445.08**	**7360431.77**	**1404989.18**	30	R 4 W	T 3 S	-0.36
C-49	**4710.02**	**4707.49**	**4706.90**	**4447.49**	**4427.49**	**7361802.01**	**1401065.35**	25	R 5 W	T 3 S	3.12
D-12	**4803.05**	**4800.56**	**4800.25**	**4455.25**	**4435.25**	**7367777.995**	**1410018.176**	20	R 4 W	T 3 S	2.80
D-13	**4720.05**	**4717.40**	**4717.32**	**4355.32**	**4335.32**	**7371760.079**	**1410629.706**	17	R 4 W	T 3 S	2.73
D-14	**4592.80**	**4590.93**	**4590.39**	**4335.39**	**4315.39**	**7374264.49**	**1403669.88**	13	R 5 W	T 3 S	2.41
D-16	**4580.11**	**4577.75**	**4577.20**	**4346.20**	**4326.20**	**7377300.289**	**1409139.940**	7	R 4 W	T 3 S	2.91
D-17	**4476.25**	**4473.81**	**4473.24**	**4343.24**	**4323.24**	**7381795.49**	**1407265.97**	6	R 4 W	T 3 S	3.01
D-18	**4476.07**	**4473.89**	**4473.20**	**4318.20** **4293.20**	**4298.20** **4268.20**	**7380823.93**	**1404691.14**	7	R 4 W	T 3 S	2.87
D-19	**4497.75**	**4495.75**	**4494.99**	**4346.99**	**4326.99**	**7379876.47**	**1406330.96**	7	R 4 W	T 3 S	2.76

MSL: mean sea level
F for selected well identifiers designates flush-mount surface completion.
Coordinates for measuring point are US State plane 1983, Utah Central 4302, NAD 1983 (CONUS), GEO1D96 (continental US)
All survey data generated by Ward Engineering of Salt Lake City, Utah

Note that well D-18 has two screened intervals.

APPENDIX E

VEOLIA Water

7 54

TOOELE ARMY DEPOT
MONITORING WELL SAMPLING DATA

Well ID: C-48F	Initial Depth to Water: 354.05'
Sample ID:	Total Depth of Well: 379.30
Duplicate ID:	Well Diameter: 4"
Sample Depth:	(a) 1 Casing Volume:
Date: 8/15/05	(b) 1 Filter Pack Water Volume:
Sampled By: [illegible]	(a)+(b)x 3= Minimum Volume to Purge:
Method of ~~Sampling~~: Development 4" Bailer	Method of ~~Purging~~: Development 4" Bailer

Time	Intake depth	Rate (gpm)	Cum. vol. (gal)	Temp (°F)	pH (units)	Conductivity (µS/cm)	Turbidity (NTUs)	TDS (g/L)	DO (mg/L)	ORP (mv)	Salinity (ppt)	Color & Sediment
1047	1st	Bailer	* 3	68.0°	8.63	1882	>1000					Cloudy/tan Fine sand
1117	10th	Bailer	30	68.3	8.75	1754	>1000					Tan Fine sand
1200	20th	Bailer	60	66.6	8.52	1669	>1000					light tan some sand
1203	Surg	ing	well	w/	Surge	Block						
1247	30th	Bailer	90	70.0	8.65	1786	>1000					light Tan none
1249	Surgin	g well	w/ Surge	Block								
1346	40th	Bailer	120	70.5	8.42	1753	>1000					light Tan none

pH Calibration (select two)				Conductivity Meter Calibration		Turbidimeter Calibration	
Buffer solution	pH 4.0	pH 7.0	pH 10.0	Solution	990	Standard	5.39
Instrument reading		7.0 0835	10.0 0839	Instrument reading	990 0841	Instrument reading	5.39 0845

Notes: *Bailer holds 3 gal

VEOLIA Water

TOOELE ARMY DEPOT
MONITORING WELL SAMPLING DATA

Well ID: C-47F	Initial Depth to Water: 354.05
Sample ID:	Total Depth of Well: 379.30
Duplicate ID:	Well Diameter: 4"
Sample Depth:	(a) 1 Casing Volume: 16 gal
Date: 8/15/05	(b) 1 Filter Pack Water Volume:
Sampled By: DA	(a) + (b) x 3 = Minimum Volume to Purge: 48 gal
Method of ~~Sampling~~: development 4" Submersible	Method of ~~Purging~~: development 4" Submersible

Time	Intake depth	Rate (gpm)	Cum. vol. (gal)	Temp (°F)	pH (units)	Conductivity (µS/cm)	Turbidity (NTUs)	TDS (g/L)	DO (mg/L)	ORP (mv)	Salinity (ppt)	Color & Sediment
1445	377	2.30	0									
1509	377	2.17	48	71.5	8.48	1776	207					cloudy none
1533	377	2.17	96	69.7	8.18	1701	97					cloudy none
1557	377	2.01	144	69.9	8.06	1675	7.18					
1558	Pump off											

pH Calibration (select two)				Conductivity Meter Calibration		Turbidimeter Calibration	
Buffer solution	pH 4.0	pH 7.0	pH 10.0	Solution		Standard	
Instrument reading				Instrument reading		Instrument reading	

Notes: 94 48

VEOLIA Water

TOOELE ARMY DEPOT
MONITORING WELL SAMPLING DATA

Well ID: C-47F	Initial Depth to Water: 354.05
Sample ID:	Total Depth of Well: 379.30
Duplicate ID:	Well Diameter: 4"
Sample Depth:	(a) 1 Casing Volume: 16 gal
Date: 8/16/05	(b) 1 Filter Pack Water Volume:
Sampled By: AOA	(a) + (b) x 3 = Minimum Volume to Purge: 48 gal
Method of ~~Sampling~~ Development 4" Submersible	Method of ~~Purging~~ Development 4" Submersible

Time	Intake depth	Rate (gpm)	Cum. vol. (gal)	Temp (°F)	pH (units)	Conductivity (µS/cm)	Turbidity (NTUs)	TDS (g/L)	DO (mg/L)	ORP (mv)	Salinity (ppt)	Color & Sediment
0843	377	2.30	144									
0907	377	2.17	192	64.5	8.09	1621	7.97					clear none
0908	Pump	off	for Recovery	Portion	of pump	Test, Also	Backflushing	well	5x			
0953	Parameters after	Backflush	64.2	8.19	1549	25.2						clear none
1017	377	2.30	240	64.8	7.96	1562	12.8					clear none
1018	Pump	off	Backflushed	well	5x							
1030	Parameters after	Backflush	65.2	7.95	1554	6.99						clear none
1054	377	2.30	288	67.1	7.83	1564	3.95					clear none
1118	377	2.17	336	65.6	7.87	1553	3.37					clear none
1142	377	2.17	384	65.2	7.82	1549	2.42					clear none

pH Calibration (select two)				Conductivity Meter Calibration		Turbidimeter Calibration	
Buffer solution	pH 4.0	pH 7.0	pH 10.0	Solution	990	Standard	5.32
Instrument reading		7.0 0820	10.0 0824	Instrument reading	990 0828	Instrument reading	5.32 0830

Notes: AM 48

~530

76

Monday August 15, 2005
Weather: Clear, Cool ~80°
Wind: from South

0811	Arrive at C-47F and start Set up SWL 354.05 TD 379.30
0832	Calibrated Equipment
0911	Attempted to lower bailer, Bailer hung up at ~330 Ft. Removed Bailer and lowered Surge block. Surge block reached bottom with no proplems, continued to surge area where bailer was hanging up. Attempted to lower bailer again. Bailer is continuing to hang up. Notified Kurt Alloway (Parsons) and Matt Ivers (Kleinfelder).
1033	Kurt Alloway (Parsons) on-site to deliver 3" Bailer
1047	Bailer reached bottom of well, 1st Bailer removed parameters Taken
1117	10th Bailer removed, Parameters Taken
1200	20th Bailer removed, Parameter Taken
1203	Surging well w/surge Block
1247	30th Bailer removed, Parameters Taken
1249 ~~1346~~	Surging well w/surg Block
1346	40th Bailer Removed, Parameters Taken
1402	Lowering pump and piping
1443	Pump on, establishing Flow
1445	Flow established at 2 gpm, Intake 377
1558	Pump off, will resume pumping tomorrow
1600	Decon Equipment
1622	Leaving C-47F → 90 day yard
1627	Arrive at 90 day yard, offloading ~250 gal of Development Water
1642	Leaving 90 day yard → GWTP

Tuesday August 16, 2005
Weather: Clear, Cool, Cloudy ~ 80°
Wind: strong gusts from North

0758	Arrive at C-47F and start Set up
0819	Calibrated Equipment
0842	Pump on, Drawdown portion of pump test Started
0843	Flow established at 2 gpm, Intake ~~333~~'
0908	Pump off, for recovery portion of pump Test, Also Back Flushing well 5x
0953	Pump on, Parameters taken after backflush
1018	Pump off, Backflushed well ~~3~~ 5x.
1030	Pump on, Parameters after Backflush
1142	Pump off, Parameters stable, Turbidity at 2.42 NTU's
1215	Removing pump and piping.
1259	Decon Equipment
1338	Leaving C-47F → 90 day yard
1344	Arrive at 90 day yard, offloading ~300 gal of Development water
1410	Leaving 90 day yard → GWTP

Owner Tooele Army Depot Address _____ County Tooele State UT

Date 8/16/05 Company performing test Parsons/Veolia Water Measured by Jeff Hamman

No. C-47F Distance from pumping well _____ Type of test Constant Pumping Rate Drawdown/Recovery Test No. _____

Measuring equipment Solinst Water Level meter

Time Data
Pump on: Date 8/16/05 Time 0842 (t)
Pump off: Date 8/16/05 Time 0908 (t')
Duration of aquifer test:
Pumping 26min Recovery 16min

Water Level Data
Static water level 354.10
Measuring point Top of PVC casing
Elevation of measuring point _____

Discharge Data
How Q measured in-line flowmeter
Depth of pump/air line 377 BTOC
Previous pumping? Yes ____ No ____
Duration _____ End _____

Date	Clock time	Time since pump started t	Time since pump stopped t'	t/t'		Depth to water / Water level measurement	Correction or Conversion	Water level	Water level change s or s'		Discharge measurement	(GPM) Rate		Comments on factors affecting test data
8/16/05	0842	0				354.10								Pump on
	0843	1				354.20								
	0844	2				354.20								
	0845	3				354.20								
	0846	4				354.20								
	0847	5				354.20								
	0852	10				354.20								
	0857	15				354.20								
	0902	20				354.20								
	0907	25				354.20								
	0908	26				354.20								Pump off
	0909	27	1			354.0								
	0910	28	2			354.05								
	0911	29	3			354.10								
	0912	30	4			354.10								
	0913	31	5			354.11								
	0914	32	6			354.12								
	0919	37	11			354.12								
	0924	42	16			354.12								

APPENDIX F

September 16, 2005
Weather: clear, warm, ~80°
Wind: From South

1104	Arrive at C-48F and Start Setup	08
	SWL 352.80' (BTOC)	
1137	Installed 4 samplers. 1 at 355 ft bgs, Top of Sampler, 1 at 363 ft bgs, Top of Sampler, 1 at 371 ft bgs, Top of Sampler, 1 at 379 ft bgs, ~~Bela~~ Bottom of Sampler	08 08 09 10
1154	Leaving C-48F → C-47F	10
1157	Arrive at C-47F and start Setup	10
	SWL 354.83 (BTOC)	10
1244	Installed 4 Samplers. 1 at 357 ft bgs, Top of Sampler, 1 at 364 ft bgs, Top of Sampler, 1 at 372 ft bgs, Top of sampler and 1 at 379 ft bgs, bottom of sampler	11 12 13
1254	Leaving C-47F → GWTP	13
		13
		14
		15
		15
		15
		15
		16

Tuesday October 11, 2005
Weather: Clear, Cool ~ 50°
Wind: None

0911 Arrive at D-18 and start Setup.
10 Cation Samples & Taken via Kabis Sampler, 500 mL poly w/ HNO3
10 Anion/Alkalinity Samples Taken via Kabis sampler, 500 mL poly. No preservative
(1037) (1) D-18FD001 (Cations) @ 155' bgs
(1044) (1) D-18FD001 (Anion/Alkalinity) @ 155' bgs
1055 (1) D-18GW001 (Cations) @ 155' bgs
1101 (1) D-18GW001 (Anions/Alkalinity) @ 155' bgs
1105 (1) D-18GMS001 (Cations) @ 155' bgs
1109 (1) D-18 MS001 (Anions/Alkalinity) at 155' bgs
1113 (1) D-18 SD001 (Cations) at 155' bgs
1118 (1) D-18 SD001 (Anions/Alkalinity) at 155' bgs
1125 (1) D-18 FR001 (Cations) at 155' bgs
1128 (1) D-18 FR001 (Anions/Alkalinity) at 155' bgs
1138 (1) D-18GW002 (Cations) at 165' bgs
1144 (1) D-18GW002 (Anions/Alkalinity) at 165' bgs
1151 (1) D-18GW003 (Cations) at 175' bgs
1156 (1) D-18GW003 (Anions/Alkalinity) at 175' bgs
1209 (1) D-18GW004 (Cations) at 180' bgs
1215 (1) D-18GW004 (Anions/Alkalinity) at 180' bgs
1223 (1) D-18GW005 (Cations) at 192 ft bgs
1229 (1) D-18GW005 (Anions/Alkalinity) at 192 ft bgs
1240 (1) D-18GW006 (Cations) at 205' bgs
1247 (1) D-18GW006 (Anions/Alkalinity) at 205' bgs
1255 Decon Sampler
1333 Leaving D-18 & GUTP

Sample Parameters

Time	Depth (Feet)	pH (unit's)	Temp (°F)	Conductivity (µS/cm)	Turbidity (NTU'S)
1039	155	7.83	53.5	1207	28.8
1139	165	7.78	54.4	1210	194
1152	175	7.84	54.9	1217	240
1210	180	7.86	55.1	1206	175
1224	192	7.83	55.2	1209	283
1241	205	7.71	55.5	1199	322

1505 Arrive at C-47F and preparing to Sample 12 VOA'S Taken 40 mL w/HCL
1515 (3) C-47FGW001 (#357)
1519 (3) C-47FGW002 (364)
1523 (3) C-47FGW003 (372)
1528 (3) C-47FGW004 (379)
1540 Leaving C-47F to deliver samples to Kurt A. at parsons field office

ANALYTICAL QUALITY CONTROL SUMMARY

Samples were collected in accordance with the analytical and quality control specifications of the Final Phase II RCRA Facility Investigation SWMU-58 Work Plan (Parsons, 2003) and the Tooele Industrial Area Project CDQMP and QAPP. Passive diffusion bag samplers were deployed in well C-47F on September 16, 2005. Samples including field quality control samples were collected on October 11, 2005 and submitted to Severn Trent Laboratories, a Utah and USACE-certified analytical laboratory.

Results were received and submitted to third party data review by Synectics. Data review included checks of the following data quality elements: Holding times, continuing calibration verification, method blanks, field blanks, laboratory control sample recovery, matrix spike and matrix spike duplicate recovery and precision, surrogate recovery, and field duplicate precision. No out of control events warranting qualification of the data were observed for well C-47F. Analytical and data validation reports are attached.

SEVERN TRENT STL®

STL Sacramento
880 Riverside Parkway
West Sacramento, CA 95605

Tel: 916 373 5600 Fax: 916 372 1059
www.stl-inc.com

October 30, 2005

STL SACRAMENTO PROJECT NUMBER: G5J130382
PO/CONTRACT: 744139-30012

Jan Barbas
Parsons
406 West South Jordan Parkway
Suite 300
South Jordan, UT 84095

Dear Mr. Barbas,

This report contains the analytical results for the samples received under chain of custody by STL Sacramento on October 13, 2005. These samples are associated with your Tooele project.

The test results in this report meet all NELAC requirements for parameters that accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (916) 374-4427.

Sincerely,

Nilo Ligi
Project Manager

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CASE NARRATIVE

STL SACRAMENTO PROJECT NUMBER G5J130382

General Comments

Samples were received at 2 degrees C.

Sample(s): 1 - 12

#1 anion bottle labeled at 1044, COC lists 1037.
#2 anion bottle labeled at 1101,1109,1118, COC lists 1055,1105,1113.
#3 anion bottle labeled at 1144, COC lists 1138.
#4 anion bottle labeled at 1156, COC lists 1151.
#5 anion bottle labeled at 1215, COC lists 1209.
#6 anion bottle labeled at 1229, COC lists 1223.
#7 anion bottle labeled at 1247, COC lists 1240.
Only the metals bottles match the COC.

WATER, 8260B, Volatile Organics

The samples were analysed for Volatile Organics by Method 8260B(GC-MS). Sample was prepared by Purge and Trap. Detection is achieved by gas chromatography – Mass Spectrometry. All QC criteria were met.

WATER, 6010B, Cations (Ca,Mg,K,Na)

The samples were analysed for Metals by Method 6010B (ICP) following extraction. Detection is achieved by Inductively Coupled Plasma –Atomic Emission Spectrometry.

WATER, 300.0A, Anions

The samples were analysed for Anions by Method 300.0 (IC). All QC criteria were met.

There were no other anomalies associated with this project.

SEVERN TRENT STL

ACCREDITED IN ACCORDANCE WITH nelac

STL Sacramento Certifications/Accreditations

Certifying State	Certificate #	Certifying State	Certificate #
Alaska	UST-055	Oregon*	CA 200005
Arizona	AZ0616	Pennsylvania	68-1272
Arkansas	04-067-0	South Carolina	87014002
California*	01119CA	Texas	TX 270-2004A
Colorado	NA	Utah*	QUAN1
Connecticut	PH-0691	Virginia	00178
Florida*	E87570	Washington	C087
Georgia	960	West Virginia	9930C, 334
Hawaii	NA	Wisconsin	998204680
Louisiana*	01944	NFESC	NA
Michigan	9947	USACE	NA
Nevada	CA44	USDA Foreign Plant	37-82605
New Jersey*	CA005	USDA Foreign Soil	S-46613
New York*	11666		

*NELAP accredited. A more detailed parameter list is available upon request. Update 1/27/05

QC Parameter Definitions

QC Batch: The QC batch consists of a set of up to 20 field samples that behave similarly (i.e., same matrix) and are processed using the same procedures, reagents, and standards at the same time.

Method Blank: An analytical control consisting of all reagents, which may include internal standards and surrogates, and is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD): An aliquot of blank matrix spiked with known amounts of representative target analytes. The LCS (and LCSD as required) is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects. If an LCSD is performed, it may also used to evaluate the precision of the process.

Duplicate Sample (DU): Different aliquots of the same sample are analyzed to evaluate the precision of an analysis.

Surrogates: Organic compounds not expected to be detected in field samples, which behave similarly to target analytes. These are added to every sample within a batch at a known concentration to determine the efficiency of the sample preparation and analytical process.

Matrix Spike and Matrix Spike Duplicate (MS/MSD): An MS is an aliquot of a matrix fortified with known quantities of specific compounds and subjected to an entire analytical procedure in order to indicate the appropriateness of the method for a particular matrix. The percent recovery for the respective compound(s) is then calculated. The MSD is a second aliquot of the same matrix as the matrix spike, also spiked, in order to determine the precision of the method.

Isotope Dilution: For isotope dilution methods, isotopically labeled analogs (internal standards) of the native target analytes are spiked into the sample at time of extraction. These internal standards are used for quantitation, and monitor and correct for matrix effects. Since matrix effects on method performance can be judged by the recovery of these analogs, there is little added benefit of performing MS/MSD for these methods. MS/MSD are only performed for client or QAPP requirements.

Control Limits: The reported control limits are either based on laboratory historical data, method requirements, or project data quality objectives. The control limits represent the estimated uncertainty of the test results.

Sample Summary
G5J130382

WO#	Sample #	Client Sample ID	Sampling Date	Received Date
HMN2H	1	D-18FD001	10/11/2005 10:37 AM	10/13/2005 09:30 AM
HMN2K	2	D-18GW001	10/11/2005 10:55 AM	10/13/2005 09:30 AM
HMN2M	3	D-18GW002	10/11/2005 11:38 AM	10/13/2005 09:30 AM
HMN2V	4	D-18GW003	10/11/2005 11:51 AM	10/13/2005 09:30 AM
HMN2W	5	D-18GW004	10/11/2005 12:09 PM	10/13/2005 09:30 AM
HMN2X	6	D-18GW005	10/11/2005 12:23 PM	10/13/2005 09:30 AM
HMN20	7	D-18GW006	10/11/2005 12:40 PM	10/13/2005 09:30 AM
HMN21	8	C-47FGW001	10/11/2005 03:15 PM	10/13/2005 09:30 AM
HMN22	9	C-47FGW002	10/11/2005 03:19 PM	10/13/2005 09:30 AM
HMN23	10	C-47FGW003	10/11/2005 03:23 PM	10/13/2005 09:30 AM
HMN24	11	C-47FGW004	10/11/2005 03:28 PM	10/13/2005 09:30 AM
HMN25	12	PARSTB14	10/11/2005 08:00 AM	10/13/2005 09:30 AM

Notes(s):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity, pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight

G5J130382

CHAIN OF CUSTODY

PARSONS

COC ID: 992

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
C-47F	C-47F	C-47FGW001	WG	DF	N	1	10/11/05	~~0855~~	1515	357	-	3

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
VOC	SVLS					

Remarks:
1515

RECEIVED IN GOOD CONDITION
UNDER COC
OCT 13 2005
INI:

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
[signature]	10/11/05 1545	[signature]	
[signature] TO: FED EX	10/12/05 1630	[signature]	10-13-05 1500

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Thursday, September 15, 2005

STL Sacramento (916) 373 - 5600

G5J130382

CHAIN OF CUSTODY

PARSONS

COC ID: 993

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
C-47F	C-47F	C-47FGW002	WG	DF	N	1	10/11/05	1519	JAL	364	–	3

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
VOC	SVLS					

Remarks:

RECEIVED IN GOOD CONDITION
UNDER COC
OCT 13 2005
INI:

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
Jeffrey Ohaumann	10/11/05 1545		
To: FED EX	10/12/05 1630	10/11/05 1545	10-13-05 0500

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Thursday, September 15, 2005

STL Sacramento (916) 373 - 5600

CHAIN OF CUSTODY

PARSONS

COC ID: 994

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
C-47F	C-47F	C-47FGW003	WG	DF	N	1	10/11/05	1523	JRD	372	-	3

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
VOC	SVLS					

Remarks:

RECEIVED IN GOOD CONDITION
UNDER COC
OCT 1 3 2005
INI:

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
Jeffrey D Hamman	10/11/05 1545		
To: FED Ex	10/12/05 1630	10/11/05 1545	10-13-05 1500

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Thursday, September 15, 2005

CHAIN OF CUSTODY

PARSONS

COC ID: 995

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
C-47F	C-47F	C-47FGW004	WG	DF	N	1	10/11/05	1528	JNA	379	-	3

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
VOC	SVLS					

Remarks:

RECEIVED IN GOOD CONDITION
UNDER COC

OCT 13 2005

INI: 05

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
D Hamman	10/11/05 1545	10/11/05 1545	
To: FedEx	10/12/05 1630		10-13-05 1500

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Thursday, September 15, 2005

CHAIN OF CUSTODY

PARSONS

COC ID: 1020

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
	FIELDQC	PARSTB14	WQ	NA	TB	1	10/11/05	0800	JAA	0	0	2

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
VOC	SVLS					

Remarks:

RECEIVED IN GOOD CONDITION
UNDER COC
OCT 13 2005
INI:

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
	10/11/05 1545	10/11/05 1545	
	10/12/05 1630		10/13/05 1500

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Friday, September 16, 2005

SEVERN TRENT **STL**

LOT RECEIPT CHECKLIST
STL Sacramento

CLIENT Parsons PM VV LOG # 35071

LOT# (QUANTIMS ID) G5J130382 QUOTE# 62837 LOCATION W23B VD

	Initials	Date
DATE RECEIVED 10-13-05 TIME RECEIVED 930	DR	10/13/05

DELIVERED BY
- ☑ FEDEX
- ☐ CA OVERNIGHT
- ☐ CLIENT
- ☐ AIRBORNE
- ☐ GOLDENSTATE
- ☐ DHL
- ☐ UPS
- ☐ BAX GLOBAL
- ☐ GO-GETTERS
- ☐ STL COURIER
- ☐ COURIERS ON DEMAND
- ☐ OTHER

CUSTODY SEAL STATUS ☑ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S) 438940, 438926

SHIPPPING CONTAINER(S) ☐ STL ☑ CLIENT ☐ N/A

TEMPERTURE RECORD (IN °C) IR ☑ 3 ☐ ☐ OTHER _____

COC #(S) 1000-1007, 992-995, 1020

TEMPERATURE BLANK Observed: N/A Corrected: _____

SAMPLE TEMPERATURE
Observed: 4 4 3 Average: 4 Corrected Average: 4

COLLECTOR'S NAME: ☐ Verified from COC ☑ Not on COC

pH MEASURED ☑ YES ☐ ANOMALY ☐ ~~N/A~~ 04/0-1315

LABELED BY.....

LABELS CHECKED BY.....

PEER REVIEW _____ ☑ NA

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING
WETCHEM ☑ N/A
VOA-ENCORES ☑ N/A

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☑ N/A

☐ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☑ N/A

☑ Clouseau ☐ TEMPERATURE EXCEEDED (2 °C – 6 °C)*1 ☐ N/A

☐ WET ICE ☐ BLUE ICE ☐ GEL PACK ☐ NO COOLING AGENTS USED ☑ PM NOTIFIED

Notes: all anion bottles have different times than COC per COC

*1 Acceptable temperature range for State of Wisconsin samples is ≤4°C.

WATER, 8260B, Volatile Organics

Parsons Corporation

Client Sample ID: C-47FGW001

GC/MS Volatiles

Lot-Sample #...: G5J130382-008 **Work Order #...:** HMN211AA **Matrix.....:** WG
Date Sampled...: 10/11/05 **Date Received..:** 10/13/05
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 100 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	100	ug/L	13
Carbon tetrachloride	ND	100	ug/L	15
Chloroethane	ND	100	ug/L	34
Chloroform	ND	100	ug/L	12
1,1-Dichloroethane	ND	100	ug/L	10
1,2-Dichloroethane	ND	100	ug/L	22
cis-1,2-Dichloroethene	ND	100	ug/L	10
trans-1,2-Dichloroethene	ND	100	ug/L	11
1,1-Dichloroethene	ND	100	ug/L	36
1,2-Dichloropropane	ND	100	ug/L	15
Ethylbenzene	ND	100	ug/L	27
Methylene chloride	ND	200	ug/L	35
Naphthalene	ND	100	ug/L	15
Tetrachloroethene	ND	100	ug/L	38
Toluene	ND	100	ug/L	25
1,1,1-Trichloroethane	ND	100	ug/L	41
1,1,2-Trichloroethane	ND	100	ug/L	31
Trichloroethene	**1600 Q**	**100**	**ug/L**	**31**
Vinyl chloride	ND	100	ug/L	12
m-Xylene & p-Xylene	ND	100	ug/L	18
o-Xylene	ND	100	ug/L	10

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	106	(70 - 130)
1,2-Dichloroethane-d4	97	(70 - 130)
Toluene-d8	105	(70 - 130)
Dibromofluoromethane	103	(70 - 130)

NOTE(S):

Q Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

Parsons Corporation

Client Sample ID: C-47FGW002

GC/MS Volatiles

Lot-Sample #...: G5J130382-009 **Work Order #...:** HMN221AA **Matrix.....:** WG
Date Sampled...: 10/11/05 **Date Received..:** 10/13/05
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 100 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	100	ug/L	13
Carbon tetrachloride	ND	100	ug/L	15
Chloroethane	ND	100	ug/L	34
Chloroform	ND	100	ug/L	12
1,1-Dichloroethane	ND	100	ug/L	10
1,2-Dichloroethane	ND	100	ug/L	22
cis-1,2-Dichloroethene	ND	100	ug/L	10
trans-1,2-Dichloroethene	ND	100	ug/L	11
1,1-Dichloroethene	ND	100	ug/L	36
1,2-Dichloropropane	ND	100	ug/L	15
Ethylbenzene	ND	100	ug/L	27
Methylene chloride	ND	200	ug/L	35
Naphthalene	ND	100	ug/L	15
Tetrachloroethene	ND	100	ug/L	38
Toluene	ND	100	ug/L	25
1,1,1-Trichloroethane	ND	100	ug/L	41
1,1,2-Trichloroethane	ND	100	ug/L	31
Trichloroethene	**1500 Q**	**100**	**ug/L**	**31**
Vinyl chloride	ND	100	ug/L	12
m-Xylene & p-Xylene	ND	100	ug/L	18
o-Xylene	ND	100	ug/L	10

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	106	(70 - 130)
1,2-Dichloroethane-d4	94	(70 - 130)
Toluene-d8	102	(70 - 130)
Dibromofluoromethane	100	(70 - 130)

NOTE(S):

Q Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

Parsons Corporation

Client Sample ID: C-47FGW003

GC/MS Volatiles

Lot-Sample #...: G5J130382-010 **Work Order #...:** HMN231AA **Matrix.....:** WG
Date Sampled...: 10/11/05 **Date Received..:** 10/13/05
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 100 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	100	ug/L	13
Carbon tetrachloride	ND	100	ug/L	15
Chloroethane	ND	100	ug/L	34
Chloroform	ND	100	ug/L	12
1,1-Dichloroethane	ND	100	ug/L	10
1,2-Dichloroethane	ND	100	ug/L	22
cis-1,2-Dichloroethene	ND	100	ug/L	10
trans-1,2-Dichloroethene	ND	100	ug/L	11
1,1-Dichloroethene	ND	100	ug/L	36
1,2-Dichloropropane	ND	100	ug/L	15
Ethylbenzene	ND	100	ug/L	27
Methylene chloride	ND	200	ug/L	35
Naphthalene	ND	100	ug/L	15
Tetrachloroethene	ND	100	ug/L	38
Toluene	ND	100	ug/L	25
1,1,1-Trichloroethane	ND	100	ug/L	41
1,1,2-Trichloroethane	ND	100	ug/L	31
Trichloroethene	**1500 Q**	**100**	**ug/L**	**31**
Vinyl chloride	ND	100	ug/L	12
m-Xylene & p-Xylene	ND	100	ug/L	18
o-Xylene	ND	100	ug/L	10

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	106	(70 - 130)
1,2-Dichloroethane-d4	95	(70 - 130)
Toluene-d8	104	(70 - 130)
Dibromofluoromethane	99	(70 - 130)

NOTE(S):

Q Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

Parsons Corporation

Client Sample ID: C-47FGW004

GC/MS Volatiles

Lot-Sample #...: G5J130382-011 **Work Order #...:** HMN241AA **Matrix.....:** WG
Date Sampled...: 10/11/05 **Date Received..:** 10/13/05
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 100 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	100	ug/L	13
Carbon tetrachloride	ND	100	ug/L	15
Chloroethane	ND	100	ug/L	34
Chloroform	ND	100	ug/L	12
1,1-Dichloroethane	ND	100	ug/L	10
1,2-Dichloroethane	ND	100	ug/L	22
cis-1,2-Dichloroethene	ND	100	ug/L	10
trans-1,2-Dichloroethene	ND	100	ug/L	11
1,1-Dichloroethene	ND	100	ug/L	36
1,2-Dichloropropane	ND	100	ug/L	15
Ethylbenzene	ND	100	ug/L	27
Methylene chloride	ND	200	ug/L	35
Naphthalene	ND	100	ug/L	15
Tetrachloroethene	ND	100	ug/L	38
Toluene	ND	100	ug/L	25
1,1,1-Trichloroethane	ND	100	ug/L	41
1,1,2-Trichloroethane	ND	100	ug/L	31
Trichloroethene	**1200 Q**	**100**	**ug/L**	**31**
Vinyl chloride	ND	100	ug/L	12
m-Xylene & p-Xylene	ND	100	ug/L	18
o-Xylene	ND	100	ug/L	10

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	104	(70 - 130)
1,2-Dichloroethane-d4	88	(70 - 130)
Toluene-d8	102	(70 - 130)
Dibromofluoromethane	94	(70 - 130)

NOTE(S):

Q Elevated reporting limit. The reporting limit is elevated due to high analyte levels.

Parsons Corporation

Client Sample ID: PARSTB14

GC/MS Volatiles

Lot-Sample #...: G5J130382-012 **Work Order #...:** HMN251AA **Matrix.....:** WQ
Date Sampled...: 10/11/05 **Date Received..:** 10/13/05
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 1 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	1.0	ug/L	0.13
Carbon tetrachloride	ND	1.0	ug/L	0.15
Chloroethane	ND	1.0	ug/L	0.34
Chloroform	ND	1.0	ug/L	0.12
1,1-Dichloroethane	ND	1.0	ug/L	0.10
1,2-Dichloroethane	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	ND	1.0	ug/L	0.10
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.11
1,1-Dichloroethene	ND	1.0	ug/L	0.36
1,2-Dichloropropane	ND	1.0	ug/L	0.15
Ethylbenzene	ND	1.0	ug/L	0.27
Methylene chloride	ND	2.0	ug/L	0.35
Naphthalene	ND	1.0	ug/L	0.15
Tetrachloroethene	ND	1.0	ug/L	0.38
Toluene	ND	1.0	ug/L	0.25
1,1,1-Trichloroethane	ND	1.0	ug/L	0.41
1,1,2-Trichloroethane	ND	1.0	ug/L	0.31
Trichloroethene	ND	1.0	ug/L	0.31
Vinyl chloride	ND	1.0	ug/L	0.12
m-Xylene & p-Xylene	ND	1.0	ug/L	0.18
o-Xylene	ND	1.0	ug/L	0.10

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	104	(70 - 130)
1,2-Dichloroethane-d4	94	(70 - 130)
Toluene-d8	101	(70 - 130)
Dibromofluoromethane	98	(70 - 130)

QC DATA ASSOCIATION SUMMARY

G5J130382

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
008	WG	SW846 8260B		5294325	
009	WG	SW846 8260B		5294325	
010	WG	SW846 8260B		5294325	
011	WG	SW846 8260B		5294325	
012	WQ	SW846 8260B		5294325	

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: G5J130382 **Work Order #...:** HNAKH1AA **Matrix.....:** WATER
MB Lot-Sample #: G5J210000-325

Prep Date.....: 10/20/05
Analysis Date..: 10/20/05 **Prep Batch #...:** 5294325
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Benzene	ND	1.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	1.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
Methylene chloride	ND	2.0	ug/L	SW846 8260B
Naphthalene	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
o-Xylene	ND	1.0	ug/L	SW846 8260B
m-Xylene & p-Xylene	ND	1.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	111	(70 - 130)
1,2-Dichloroethane-d4	92	(70 - 130)
Toluene-d8	102	(70 - 130)
Dibromofluoromethane	95	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: G5J130382 **Work Order #...:** HNAKH1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: G5J210000-325 HNAKH1AD-LCSD
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Benzene	**20.0**	**19.2**	**ug/L**	**96**		**SW846 8260B**
	20.0	**18.0**	**ug/L**	**90**	**6.1**	**SW846 8260B**
1,1-Dichloroethene	**20.0**	**18.9**	**ug/L**	**94**		**SW846 8260B**
	20.0	**17.7**	**ug/L**	**89**	**6.3**	**SW846 8260B**
Toluene	**20.0**	**20.5**	**ug/L**	**102**		**SW846 8260B**
	20.0	**19.7**	**ug/L**	**99**	**3.7**	**SW846 8260B**
Trichloroethene	**20.0**	**19.7**	**ug/L**	**98**		**SW846 8260B**
	20.0	**18.4**	**ug/L**	**92**	**6.8**	**SW846 8260B**
Chlorobenzene	**20.0**	**21.0**	**ug/L**	**105**		**SW846 8260B**
	20.0	**20.1**	**ug/L**	**100**	**4.8**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	113	(70 - 130)
	116	(70 - 130)
1,2-Dichloroethane-d4	88	(70 - 130)
	89	(70 - 130)
Toluene-d8	102	(70 - 130)
	102	(70 - 130)
Dibromofluoromethane	91	(70 - 130)
	93	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: G5J130382 **Work Order #...:** HNAKH1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: G5J210000-325 HNAKH1AD-LCSD
Prep Date.....: 10/20/05 **Analysis Date..:** 10/20/05
Prep Batch #...: 5294325
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**96**	**(80 - 120)**			**SW846 8260B**
	90	**(80 - 120)**	**6.1**	**(0-30)**	**SW846 8260B**
1,1-Dichloroethene	**94**	**(80 - 120)**			**SW846 8260B**
	89	**(80 - 120)**	**6.3**	**(0-30)**	**SW846 8260B**
Toluene	**102**	**(80 - 120)**			**SW846 8260B**
	99	**(80 - 120)**	**3.7**	**(0-30)**	**SW846 8260B**
Trichloroethene	**98**	**(80 - 120)**			**SW846 8260B**
	92	**(80 - 120)**	**6.8**	**(0-30)**	**SW846 8260B**
Chlorobenzene	**105**	**(80 - 120)**			**SW846 8260B**
	100	**(80 - 120)**	**4.8**	**(0-30)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	113	(70 - 130)
	116	(70 - 130)
1,2-Dichloroethane-d4	88	(70 - 130)
	89	(70 - 130)
Toluene-d8	102	(70 - 130)
	102	(70 - 130)
Dibromofluoromethane	91	(70 - 130)
	93	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

AUTOMATED DATA REVIEW SUMMARY

Facility:	SWMU 58
Event:	2004_2005 SWMU 58 Phase II RFI GW
Contract:	9T9H213C
Sample Delivery Group:	G5J130382
Field Contractor:	Parsons Engineering Science, Salt Lake City
Laboratory Contractor:	SEVERN TRENT LABS., WEST SACRAMENTO, CA
Data Review Contractor:	Synectics, Sacramento, CA
Guidance Document:	*Final Phase II RCRA Facility Investigation SWMU-58 Workplan, December 2003*

Analytical Method	Normal Samples	Field QC Samples
E300	6	1
E310.1	6	1
SW6010B	6	1
SW8260B	4	1

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistant with the requirements contained in Final Phase II RCRA Facility Investigation SWMU-58 Workplan, December 2003 to the extent possible. Where definitive guidance is not provided, data has been evaluated in a conservative manner using professional judgment. In cases where two qualifiers are listed as an action, such as "J/UJ", the first qualifier applies to positive results, and the second to non-detect results.

Samples were collected by Parsons Engineering Science, Salt Lake City; analyses were performed by SEVERN TRENT LABS., WEST SACRAMENTO, CA and were reported under sample delivery group (SDG) G5J130382. Results have been evaluated electronically using electronic data deliverables (EDDs) provided by the laboratory. The laboratory data summary forms (hard copy) have been reviewed during this effort and compared to the automated review output. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative. The following quality control elements were evaluated during this review effort:

Technical Holding Times
Continuing Calibration Verification
Method Blank Contamination
Field Blank Contamination
Blank Spike Accuracy
Blank Spike Precision
Matrix Spike Accuracy
Matrix Spike Precision
Surrogate Recovery
Laboratory Duplicate Precision
Field Duplicate Precision

A minimum of ten percent of sample and QC results were manually evaluated for compliance with project specific requirements and consistency with hard copy results. The following reports were generated during the evaluation of this data set and are presented as attachments to this report as applicable.

Data Submission Warnings – Warnings encountered during the data submission process are evaluated and their affect on data quality is discussed in the narrative.

Batch – The analytical batch report is reviewed for completeness and compliance with project specific requirements. Incomplete or non-compliant run sequences are identified and their impact on data quality are discussed in the narrative.

QC Outlier – Results exceeding the evaluation criteria are reviewed for compliance with project requirements and a minimum of ten percent of the non-compliant QC values reported electronically are verified for consistency with hard-copy values.

Qualified Results – Qualified results are evaluated for compliance with project requirements and ten percent of qualified results are verified for consistency with the QC Outlier Report.

Field Duplicate – Field duplicate comparison results are evaluated for compliance with project requirements and ten percent of values reported are verified for consistency with the hard-copy data.

Rejected Results – All rejected results are evaluated for compliance with project requirements. The reason for rejection of the data is verified against hard copy data.

Analytical deficiencies, project non-compliance issues and inconsistencies with hard copy results observed during ADR evaluation process and their impact on data quality are summarized in the ADR narrative.

Out of control events experienced by the laboratory have warranted the qualification of 0 % (0 results) and the rejection of 0 % (0 results) of the data set. These deficiencies are detailed in the referenced attachments, and discussed in the ADR narrative, where appropriate.

Evin McKinney

Released by

12-16-2005

Date

Reason and Comment Codes

Code	Definition
C1	Diluted Out
C2	Flag Parent Only
C2S	Flag Parent (Soil); Batch (Water)
C3	No Action
C4	No QC Outliers
C5	One or both values <5x RL
C6	Recalculated Value
C7	Material Blanks
C8	Spike Insignificant
C9	No Flags; set to ND by method/cal. blank

Reasons

Code	Definition
A	Serial dilution
B	Calibration Blank - Negative
	Negative Blank
B1	Blank
B2	Calibration Blank
C	Continuing Calibration Verification
	Continuing Calibration Verification RRF
D	BS RPD
	Field Duplicate RPD
D1	Lab Replicate RPD
D2	MS RPD
E	Exceeds LinearCalibration Range
F	Hydrocarbon pattern does not match standard
G	Initial Calibration RRF
	Initial Calibration RSD
H	Test Hold Time
	Prep Hold Time
I	Internal standard
K1	Equip Blank
K2	Field Blank
K3	Trip Blank
L	LCS Recovery
M	MS Recovery
N	Blank - No Action
O	Interference check sample
P	Column RPD
Q	Material Blank
S	Surrogate
T	Receipt Temperature
TI	Tentatively Identified Compound
TR	Trace Level Detect
W	Column breakdown (pesticides)
X	Raised reporting limit
Y	Analyte not confirmed on second column

ADR CASE NARRATIVE

Laboratory ID: G5J130382

Prior to loading and processing data, modifications to the project setup may be requested by the laboratory and/or contractor, and approved by the client. These modifications allow the loading of data that was not in complete agreement with the project guidance document; in some cases, variances to the project document may be in process, in others, the changes are required to accept data that had not been generated in compliance with the project guidance document. All project setup modifications are listed below:

1. **Missing CV Check**
   For the requirements of this project, electronic continuing calibration verifications (CV) were not provided for review for method E300. Thus, the Missing CV check was changed from an error to a warning to allow loading of the data without electronic CVs, per the project chemist.

Chemistry Data Quality

The data submission process incorporates a series of stored procedures designed to identify conditions in electronic data deliverables (EDD) that would affect chemistry data quality. These conditions will not result in the qualification of the data; however, these findings should be reviewed for possible contractual non-compliance. A brief explanation of each finding encountered for this data set and the potential impact on chemistry data quality is summarized below.

There were no issues affecting chemistry data quality associated with this sample delivery group.

Data Verification

The data verification process includes a manual review of information on the chains of custody and laboratory case narratives, a check of all rejected results and a minimum of 10 percent of sample and QC results for consistency with hard copy reports, and a cursory review of all reports generated during the automated review process. The following comments are associated with the verification process:

1. **Anions by E300**
   It was noted that the laboratory did not provide CV information in the EDD. The data was manually reviewed and found to be within project acceptance limits. No qualifiers have been applied on this basis.

2. **Volatiles by SW8260**
   An matrix spike (MS) was not provided on the EDD for the analytical batch for this SDG. No qualifiers have been applied on this basis.

All of the reports utilized during the data verification process are provided as attachments to this report.

Batch Report

Facility: SWMU 58
Lab: SVLS
Filename: G5J130382
Status: Certified - 12/2/2005
User: BonnieMcNeill

Test Method: E300
Leach Method: NONE

Test Batch	Prep Batch	Leach Batch	Location	Matrix	Field Sample ID	Lab Sample ID	Test Date and Time	Sample Type
IC61017	NA	NA	LABQC	WQ		G5J180000413	10/17/2005 9:52:00AM	BS1
	NA	NA	LABQC	WQ		G5J180000413	10/17/2005 10:09:00AM	LB1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/17/2005 10:11:00AM	N1
	NA	NA	D-18	WG	D-18FD001	G5J130382001	10/17/2005 2:53:00PM	FD1
	NA	NA	D-18	WG	D-18GW002	G5J130382003	10/17/2005 3:28:00PM	N1
	NA	NA	D-18	WG	D-18GW003	G5J130382004	10/17/2005 3:46:00PM	N1
	NA	NA	D-18	WG	D-18GW004	G5J130382005	10/17/2005 4:03:00PM	N1
	NA	NA	D-18	WG	D-18GW005	G5J130382006	10/17/2005 4:21:00PM	N1
	NA	NA	D-18	WG	D-18GW006	G5J130382007	10/17/2005 4:38:00PM	N1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/17/2005 6:23:00PM	MS1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/17/2005 6:23:00PM	SD1
IC61018	NA	NA	LABQC	WQ		G5J190000325	10/18/2005 11:58:00AM	BS1
	NA	NA	LABQC	WQ		G5J190000325	10/18/2005 12:15:00PM	LB1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/18/2005 12:33:00PM	N1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/18/2005 12:50:00PM	MS1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/18/2005 1:08:00PM	SD1
	NA	NA	D-18	WG	D-18GW002	G5J130382003	10/18/2005 1:25:00PM	N1
	NA	NA	D-18	WG	D-18GW003	G5J130382004	10/18/2005 1:43:00PM	N1
	NA	NA	D-18	WG	D-18GW004	G5J130382005	10/18/2005 2:00:00PM	N1
	NA	NA	D-18	WG	D-18GW005	G5J130382006	10/18/2005 2:18:00PM	N1
	NA	NA	D-18	WG	D-18GW006	G5J130382007	10/18/2005 2:35:00PM	N1
	NA	NA	D-18	WG	D-18FD001	G5J130382001	10/18/2005 2:53:00PM	FD1

Batch Report

Facility: SWMU 58
Lab: SVLS
Filename: G5J130382
Status: Certified - 12/2/2005
User: BonnieMcNeill

Test Method: E310.1
Leach Method: NONE

Test Batch	Prep Batch	Leach Batch	Location	Matrix	Field Sample ID	Lab Sample ID	Test Date and Time	Sample Type
AT21024	NA	NA	LABQC	WQ		G5J210000172	10/24/2005 2:15:00PM	BS1
	NA	NA	LABQC	WQ		G5J210000172	10/24/2005 2:22:00PM	LB1
	NA	NA	D-18	WG	D-18FD001	G5J130382001	10/24/2005 2:29:00PM	FD1
	NA	NA	D-18	WG	D-18FD001	G5J130382001	10/24/2005 2:36:00PM	LR1
	NA	NA	D-18	WG	D-18GW001	G5J130382002	10/24/2005 2:43:00PM	N1
	NA	NA	D-18	WG	D-18GW002	G5J130382003	10/24/2005 2:50:00PM	N1
	NA	NA	D-18	WG	D-18GW003	G5J130382004	10/24/2005 2:57:00PM	N1
	NA	NA	D-18	WG	D-18GW004	G5J130382005	10/24/2005 3:05:00PM	N1
	NA	NA	D-18	WG	D-18GW005	G5J130382006	10/24/2005 3:12:00PM	N1
	NA	NA	D-18	WG	D-18GW006	G5J130382007	10/24/2005 3:19:00PM	N1

Batch Report

Facility: SWMU 58
Lab: SVLS
Filename: G5J130382
Status: Certified - 12/2/2005
User: BonnieMcNeill

Test Method: SW6010B
Leach Method: NONE

Test Batch	Prep Batch	Leach Batch	Location	Matrix	Field Sample ID	Lab Sample ID	Test Date and Time	Sample Type
P051018	NA	NA	LABQC	WQ		ICV4	10/18/2005 6:02:00PM	CV1
	NA	NA	LABQC	WQ		ICB	10/18/2005 6:10:00PM	CB1
	NA	NA	LABQC	WQ		CCV	10/18/2005 7:03:00PM	CV2
	NA	NA	LABQC	WQ		CCB	10/18/2005 7:07:00PM	CB2
	NA	NA	LABQC	WQ		CCV	10/18/2005 7:56:00PM	CV3
	NA	NA	LABQC	WQ		CCB	10/18/2005 8:00:00PM	CB3
	5291147	NA	LABQC	WQ		G5J180000147	10/18/2005 8:04:00PM	LB1
	5291147	NA	LABQC	WQ		G5J180000147	10/18/2005 8:08:00PM	BS1
	NA	NA	LABQC	WQ		CCV	10/18/2005 8:38:00PM	CV4
	NA	NA	LABQC	WQ		CCB	10/18/2005 8:42:00PM	CB4
	5291147	NA	D-18	WG	D-18FD001	G5J130382001	10/18/2005 8:46:00PM	FD1
	5291147	NA	D-18	WG	D-18GW001	G5J130382002	10/18/2005 8:50:00PM	N1
	5291147	NA	D-18	WG	D-18GW001	G5J130382002	10/18/2005 8:58:00PM	MS1
	5291147	NA	D-18	WG	D-18GW001	G5J130382002	10/18/2005 9:02:00PM	SD1
	5291147	NA	D-18	WG	D-18GW002	G5J130382003	10/18/2005 9:16:00PM	N1
	5291147	NA	D-18	WG	D-18GW003	G5J130382004	10/18/2005 9:20:00PM	N1
	5291147	NA	D-18	WG	D-18GW004	G5J130382005	10/18/2005 9:24:00PM	N1
	5291147	NA	D-18	WG	D-18GW005	G5J130382006	10/18/2005 9:29:00PM	N1
	NA	NA	LABQC	WQ		CCV	10/18/2005 9:36:00PM	CV5
	NA	NA	LABQC	WQ		CCB	10/18/2005 9:40:00PM	CB5
	5291147	NA	D-18	WG	D-18GW006	G5J130382007	10/18/2005 9:44:00PM	N1
	NA	NA	LABQC	WQ		CCV	10/18/2005 10:00:00PM	CV6
	NA	NA	LABQC	WQ		CCB	10/18/2005 10:04:00PM	CB6
	NA	NA	LABQC	WQ		CCV	10/18/2005 10:59:00PM	CV7
	NA	NA	LABQC	WQ		CCB	10/18/2005 11:03:00PM	CB7
	NA	NA	LABQC	WQ		CCV	10/18/2005 11:48:00PM	CV8
	NA	NA	LABQC	WQ		CCB	10/18/2005 11:52:00PM	CB8

Batch Report

Facility: SWMU 58
Lab: SVLS
Filename: G5J130382
Status: Certified - 12/2/2005
User: BonnieMcNeill

Test Method: SW6010B
Leach Method: NONE

Test Batch	Prep Batch	Leach Batch	Location	Matrix	Field Sample ID	Lab Sample ID	Test Date and Time	Sample Type
P051019	NA	NA	LABQC	WQ		CCV	10/19/2005 12:45:00AM	CV9
	NA	NA	LABQC	WQ		CCB	10/19/2005 12:49:00AM	CB9
	NA	NA	LABQC	WQ		CCV	10/19/2005 1:23:00AM	CV10
	NA	NA	LABQC	WQ		CCB	10/19/2005 1:27:00AM	CB10

Batch Report

Facility: SWMU 58
Lab: SVLS
Filename: G5J130382
Status: Certified - 12/2/2005
User: BonnieMcNeill

Test Method: SW8260B
Leach Method: NONE

Test Batch	Prep Batch	Leach Batch	Location	Matrix	Field Sample ID	Lab Sample ID	Test Date and Time	Sample Type
HP91006	NA	NA	LABQC	WQ		LCS/SS	10/6/2005 6:22:00PM	CV1
	NA	NA	LABQC	WQ		LCS/SS	10/6/2005 6:45:00PM	CV2
HP91020	NA	NA	LABQC	WQ		HSL020	10/20/2005 11:59:00AM	CV3
	5294325	NA	LABQC	WQ		G5J210000325	10/20/2005 12:39:00PM	BS1
	5294325	NA	LABQC	WQ		G5J210000325	10/20/2005 1:02:00PM	BD1
	5294325	NA	LABQC	WQ		G5J210000325	10/20/2005 1:54:00PM	LB1
	5294325	NA	C-47F	WG	C-47FGW001	G5J130382008	10/20/2005 4:28:00PM	N1
	5294325	NA	C-47F	WG	C-47FGW002	G5J130382009	10/20/2005 4:52:00PM	N1
	5294325	NA	C-47F	WG	C-47FGW003	G5J130382010	10/20/2005 5:15:00PM	N1
	5294325	NA	C-47F	WG	C-47FGW004	G5J130382011	10/20/2005 5:37:00PM	N1
	5294325	NA	FIELDQC	WQ	PARSTB14	G5J130382012	10/20/2005 6:00:00PM	TB1

QC Outliers

Facility: SWMU 58
Event: 2004_2005 SWMU 58 Phase II RFI GW
Reference: 9T9H213C

SDG G5J130382

Test/Leach	QCElement	Sample	Type	Dil'n	Analyte	Result	Units	Warning Limits	Control Limits	Qualifier	Reason	Cmnt.
SW6010B/NONE	Blank Cont.	P5291147LABQC	LB1	1.00	Calcium	0.028	MG/L	< 0.0067	< 0.5	U / None	B1	
SW6010B/NONE	Blank Cont.	P5291147LABQC	LB1	1.00	Sodium	0.043	MG/L	< 0.0082	< 0.5	U / None	B1	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB1	1.00	Potassium	0.075	MG/L	< 0.045	< 1	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB1	1.00	Sodium	0.81	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB2	1.00	Sodium	0.52	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB3	1.00	Calcium	0.0074	MG/L	< 0.0067	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB3	1.00	Sodium	1.1	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB4	1.00	Potassium	0.071	MG/L	< 0.045	< 1	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB4	1.00	Sodium	0.68	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB5	1.00	Potassium	0.051	MG/L	< 0.045	< 1	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB6	1.00	Potassium	0.064	MG/L	< 0.045	< 1	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB6	1.00	Sodium	0.33	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB7	1.00	Calcium	0.0078	MG/L	< 0.0067	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB7	1.00	Sodium	0.96	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB8	1.00	Calcium	0.0081	MG/L	< 0.0067	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051018LABQC	CB8	1.00	Sodium	0.051	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051019LABQC	CB1(	1.00	Calcium	0.0089	MG/L	< 0.0067	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051019LABQC	CB1(	1.00	Potassium	0.046	MG/L	< 0.045	< 1	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051019LABQC	CB1(	1.00	Sodium	0.11	MG/L	< 0.0082	< 0.5	U / None	B2	
SW6010B/NONE	Blk. Cont.	TP051019LABQC	CB9	1.00	Sodium	0.94	MG/L	< 0.0082	< 0.5	U / None	B2	

Detected Results

Facility: SWMU 58
Event: 2004_2005 SWMU 58 Phase II RFI GW
Reference: ISSS-539-01

SDG: G5J130382

Inorganic Anions In Water By Ion Chromatography

Test/Leach	Matrix	Field Sample ID	Type	Analyte	RL	Lab Result		Qualified Result	Units	Reason
E300/NONE	WG	D-18FD001	FD	Chloride	10	300	q	300	MG/L	
E300/NONE	WG	D-18FD001	FD	Sulfate (as SO4)	2.0	57	q	57	MG/L	
E300/NONE	WG	D-18GW001	N	Chloride	10	300	q	300	MG/L	
E300/NONE	WG	D-18GW001	N	Sulfate (as SO4)	2.0	56	q	56	MG/L	
E300/NONE	WG	D-18GW002	N	Chloride	10	280	q	280	MG/L	
E300/NONE	WG	D-18GW002	N	Sulfate (as SO4)	2.0	55	q	55	MG/L	
E300/NONE	WG	D-18GW003	N	Chloride	10	280	q	280	MG/L	
E300/NONE	WG	D-18GW003	N	Sulfate (as SO4)	2.0	53	q	53	MG/L	
E300/NONE	WG	D-18GW004	N	Chloride	10	280	q	280	MG/L	
E300/NONE	WG	D-18GW004	N	Sulfate (as SO4)	2.0	53	q	53	MG/L	
E300/NONE	WG	D-18GW005	N	Chloride	10	280	q	280	MG/L	
E300/NONE	WG	D-18GW005	N	Sulfate (as SO4)	2.0	54	q	54	MG/L	
E300/NONE	WG	D-18GW006	N	Chloride	10	280	q	280	MG/L	
E300/NONE	WG	D-18GW006	N	Sulfate (as SO4)	2.0	53	q	53	MG/L	

Alkalinity (Titrimetric)

Test/Leach	Matrix	Field Sample ID	Type	Analyte	RL	Lab Result	Qualified Result	Units	Reason
E310.1/NONE	WG	D-18FD001	FD	Alkalinity, Total (as CaCO3)	5.0	160	160	MG/L	
E310.1/NONE	WG	D-18GW001	N	Alkalinity, Total (as CaCO3)	5.0	160	160	MG/L	
E310.1/NONE	WG	D-18GW002	N	Alkalinity, Total (as CaCO3)	5.0	160	160	MG/L	
E310.1/NONE	WG	D-18GW003	N	Alkalinity, Total (as CaCO3)	5.0	160	160	MG/L	
E310.1/NONE	WG	D-18GW004	N	Alkalinity, Total (as CaCO3)	5.0	170	170	MG/L	
E310.1/NONE	WG	D-18GW005	N	Alkalinity, Total (as CaCO3)	5.0	160	160	MG/L	
E310.1/NONE	WG	D-18GW006	N	Alkalinity, Total (as CaCO3)	5.0	160	160	MG/L	

SDG: G5J130382

Trace Metals by ICP

Test/Leach	Matrix	Field Sample ID	Type	Analyte	RL	Lab Result		Qualified Result	Units	Reason
SW6010B/NONE	WG	D-18FD001	FD	Calcium	0.50	100	B	100	MG/L	
SW6010B/NONE	WG	D-18FD001	FD	Magnesium	0.50	40		40	MG/L	
SW6010B/NONE	WG	D-18FD001	FD	Potassium	1.0	4.1		4.1	MG/L	
SW6010B/NONE	WG	D-18FD001	FD	Sodium	0.50	90	B	90	MG/L	
SW6010B/NONE	WG	D-18GW001	N	Calcium	0.50	100	B	100	MG/L	
SW6010B/NONE	WG	D-18GW001	N	Magnesium	0.50	40		40	MG/L	
SW6010B/NONE	WG	D-18GW001	N	Potassium	1.0	4.0		4.0	MG/L	
SW6010B/NONE	WG	D-18GW001	N	Sodium	0.50	89	B	89	MG/L	
SW6010B/NONE	WG	D-18GW002	N	Calcium	0.50	110	B	110	MG/L	
SW6010B/NONE	WG	D-18GW002	N	Magnesium	0.50	39		39	MG/L	
SW6010B/NONE	WG	D-18GW002	N	Potassium	1.0	4.0		4.0	MG/L	
SW6010B/NONE	WG	D-18GW002	N	Sodium	0.50	83	B	83	MG/L	
SW6010B/NONE	WG	D-18GW003	N	Calcium	0.50	120	B	120	MG/L	
SW6010B/NONE	WG	D-18GW003	N	Magnesium	0.50	41		41	MG/L	
SW6010B/NONE	WG	D-18GW003	N	Potassium	1.0	4.1		4.1	MG/L	
SW6010B/NONE	WG	D-18GW003	N	Sodium	0.50	87	B	87	MG/L	
SW6010B/NONE	WG	D-18GW004	N	Calcium	0.50	110	B	110	MG/L	
SW6010B/NONE	WG	D-18GW004	N	Magnesium	0.50	40		40	MG/L	
SW6010B/NONE	WG	D-18GW004	N	Potassium	1.0	4.0		4.0	MG/L	
SW6010B/NONE	WG	D-18GW004	N	Sodium	0.50	87	B	87	MG/L	
SW6010B/NONE	WG	D-18GW005	N	Calcium	0.50	160	B	160	MG/L	
SW6010B/NONE	WG	D-18GW005	N	Magnesium	0.50	46		46	MG/L	
SW6010B/NONE	WG	D-18GW005	N	Potassium	1.0	5.7		5.7	MG/L	
SW6010B/NONE	WG	D-18GW005	N	Sodium	0.50	91	B	91	MG/L	
SW6010B/NONE	WG	D-18GW006	N	Calcium	0.50	160	B	160	MG/L	
SW6010B/NONE	WG	D-18GW006	N	Magnesium	0.50	42		42	MG/L	
SW6010B/NONE	WG	D-18GW006	N	Potassium	1.0	4.4		4.4	MG/L	
SW6010B/NONE	WG	D-18GW006	N	Sodium	0.50	87	B	87	MG/L	

Volatile Organic Compounds by Capillary GC/MS

Test/Leach	Matrix	Field Sample ID	Type	Analyte	RL	Lab Result		Qualified Result	Units	Reason
SW8260B/NONE	WG	C-47FGW001	N	Trichloroethene (TCE)	100	1,600	q	1,600	UG/L	

SDG: G5J130382

Volatile Organic Compounds by Capillary GC/MS

Test/Leach	Matrix	Field Sample ID	Type	Analyte	RL	Lab Result		Qualified Result	Units	Reason
SW8260B/NONE	WG	C-47FGW002	N	Trichloroethene (TCE)	100	1,500	q	1,500	UG/L	
SW8260B/NONE	WG	C-47FGW003	N	Trichloroethene (TCE)	100	1,500	q	1,500	UG/L	
SW8260B/NONE	WG	C-47FGW004	N	Trichloroethene (TCE)	100	1,200	q	1,200	UG/L	

DATA MANAGEMENT NARRATIVE

Laboratory ID: G5J130382

Data Submission

The data submission process incorporates a series of stored procedures designed to identify valid value (VVL), logical (LE), and project specific errors (PSE) in electronic data deliverables (EDD). Automated data review (ADR) is most efficient when data generators correct all errors. Dependent primarily upon the electronic reporting capabilities of the data generator, the severity of the logical and project specific errors listed below have been reduced to warnings. A warning log is generated with each data submission and is presented as an attachment to this report. A brief explanation of each error encountered for this data set and the potential impact on data quality is summarized below.

1. **Project Specific Error (PSE) spPSE01L_Missing_CCV**
   This PSE occurs when an analytical batch is reported without a calibration standard for one or more of the analytes in the batch. In some cases this may be acceptable, such as in the case of multicomponent analytes which are not required to be included in all calibration standards. Chemistry review is necessary to determine whether or not this warning will affect data quality.

2. **Logical Error (LE) spLE01_ANADATE_Unique**
   This logical error occurs when multiple analyses are submitted within the same analytical batch that have identical analysis dates and times. This occurs in the laboratory when instruments are able to perform analyses in less than one minute, as ERPIMS specification records time only to the minute. However, it can also occur if the time of analysis is not recorded by an instrument, and the laboratory analyst reports all measurements in a batch with the same time. Whenever possible, actual times of analysis should be recorded and reported.

3. **Project Specific Error (PSE) spPSE01L_Invalid_Test_Prep_Metals**
   This PSE occurs when the preparation EXMCODE is not either TOTAL or FLDFLT. However, this warning should not have occurred, as it does not pertain to this project.

4. **Project Specific Error (PSE) spPSE01L_Invalid_Units_QC**
   This PSE occurs when laboratory quality control samples are reported with units of percent as opposed to true values. This inconsistency does not affect data quality, unless the submittal is scheduled for delivery to the AFCEE in accordance with the ERPIMS 4.0 specification. Automated data review can be performed for laboratory QC when units are reported in percent or in concentration units. However, to avoid this warning on future submittals, the laboratory would need to report these values in units of concentration (i.e., ug/L).

5. **Project Specific Error (PSE) spPSE01L_PQL**
   This PSE occurs when the Reporting Limit (RL) reported by the laboratory exceeds that specified in the governing project document. This error may affect data quality as it indicates that laboratory cannot report in accordance with project requirements. To avoid this warning on future submittals, the RL must be equal to or below the value specified in the project documentation.

6. **Logical Error (LE) spLE01_QAPPFLAGS_F**
   This LE warning occurs when there are positive results less than the RL and associated QAPPFLAGS are not “F”. This requirement is only necessary if the project is an AFCEE project or if the data is to be submitted to ERPIMS. To avoid this warning in the future, apply QAPPFLAGS of “F” whenever the detected result is less than the RL.

7. **Valid Value List (VVL) spVVL32_LABLOTCTL**
   This warning occurs when the laboratory does not include the preparation batch number (LABLOTCTL). The LABLOTCTL field should be populated with the same ID for all field and QC samples extracted/prepared in the same batch. To avoid this warning on future submittals, populate the LABLOTCTL field.

8. **Valid Value List (VVL) spVVL33_CALREFID**
   This valid value warning occurs when the laboratory does not include the calibration reference ID (CALREFID). To avoid this warning in the future, the laboratory should include the CALREFID on the electronic data.

9. **Valid Value List (VVL) spVVL56_QAPPFLAGS**
   This valid value warning occurs when there are QAPPFLAGS in the file that are not official AFCEE qualifiers. Using the official AFCEE qualifiers is necessary only if the project is an AFCEE project or if the data is to be submitted to ERPIMS. To avoid this warning in the future, apply only AFCEE qualifiers to the QAPPFLAGS field.

A detailed description of the stored procedures utilized during the data submission process is provided as an attachment to this report (Submission Warnings).

Submission Warnings

Facility: SWMU 58
Data Generator: SVLS
File Name: N:\Temp Data\Parsons\Tooelle\G5J130382\G5J130382.txt

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PSE

Query Name	Finding	Record Count
spPSE01L_Missing_CCV	ANMCODE is E300; LCHMETH is NONE; ANALOT is IC61018; PARLABEL is CL	2
	ANMCODE is E300; LCHMETH is NONE; ANALOT is IC61017; PARLABEL is SO4	2

LE

Query Name	Finding	Record Count
spLE01_ANADATE_Unique	ANMCODE is E300; ANADATE is Oct 17 2005 6:23PM; ANALOT is IC61017	2

PSE

Query Name	Finding	Record Count
spPSE01L_Invalid_Test_Prep_Metals	ANMCODE is SW6010B; EXMCODE is SW3010; PRCCODE is MET; SACODE is MS	4
	ANMCODE is SW6010B; EXMCODE is SW3010; PRCCODE is MET; SACODE is LB	4
	ANMCODE is SW6010B; EXMCODE is SW3010; PRCCODE is MET; SACODE is BS	4
	ANMCODE is SW6010B; EXMCODE is SW3010; PRCCODE is MET; SACODE is N	24
	ANMCODE is SW6010B; EXMCODE is SW3010; PRCCODE is MET; SACODE is FD	4
	ANMCODE is SW6010B; EXMCODE is SW3010; PRCCODE is MET; SACODE is SD	4
spPSE01L_Invalid_Units_QC	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is TB/STD; UNITS is percent	3
	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is N/STD; UNITS is percent	12
	ANMCODE is SW6010B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is CV/MET; UNITS is PERCENT	40
	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is CV/STD; UNITS is percent	9
	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is LB/STD; UNITS is percent	3
	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is BD/STD; UNITS is percent	3
	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is CV/ORG; UNITS is PERCENT	63

Submission Warnings

Facility: SWMU 58
Data Generator: SVLS
File Name: N:\Temp Data\Parsons\Tooelle\G5J130382\G5J130382.txt

PSE

Query Name	Finding	Record Count
spPSE01L_Invalid_Units_QC	ANMCODE is SW8260B; LCHMETH is NONE; Matrix Class is W; SACODE/PRCCODE is BS/STD; UNITS is percent	3
spPSE01L_PQL	SACODE is N; PARLABEL is CL; RL (EDD: Reported / Corrected) is 10.0000 / 1.0000 MG/L; RL (QAPjP) is 0.5000 MG/L; DILUTION is 10.00	6
	SACODE is FD; PARLABEL is NA; RL (EDD: Reported / Corrected) is 0.5000 / 0.5000 MG/L; RL (QAPjP) is 0.2000 MG/L; DILUTION is 1.00	1
	SACODE is N; PARLABEL is NA; RL (EDD: Reported / Corrected) is 0.5000 / 0.5000 MG/L; RL (QAPjP) is 0.2000 MG/L; DILUTION is 1.00	6
	SACODE is FD; PARLABEL is CL; RL (EDD: Reported / Corrected) is 10.0000 / 1.0000 MG/L; RL (QAPjP) is 0.5000 MG/L; DILUTION is 10.00	1
	SACODE is FD; PARLABEL is MG; RL (EDD: Reported / Corrected) is 0.5000 / 0.5000 MG/L; RL (QAPjP) is 0.1000 MG/L; DILUTION is 1.00	1
	SACODE is N; PARLABEL is MG; RL (EDD: Reported / Corrected) is 0.5000 / 0.5000 MG/L; RL (QAPjP) is 0.1000 MG/L; DILUTION is 1.00	6

VVL

Query Name	Finding	Record Count
spLE01_QAPPFLAGS_F	PARVQ is TR; PARVAL is 0.0280; RL is 0.5000; QAPPFLAGS is J	1
	PARVQ is TR; PARVAL is 0.0430; RL is 0.5000; QAPPFLAGS is J	1
spVVL32_LABLOTCTL	LABLOTCTL is Null	183
spVVL33_CALREFID	CALREFID is Null	234
spVVL56_QAPPFLAGS	QAPPFLAGS is q	18

Total Record Count: 385
Error Count: 0
Warning Count: 644

DATA ENTRY SHEET

GW-ADV Version 3.0; 02/03

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES: X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	1.20E+03	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
11	15	10729	10729	0	0	A	S	S		

MORE ↓

Don't Use Look-Up!

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
S	1.66	0.375	0.054								

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.83	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-04	1
				Used to calculate risk-based groundwater concentration.	

END

CHEMICAL PROPERTIES SHEET

Diffusivity in air, D_a (cm^2/s)	Diffusivity in water, D_w (cm^2/s)	Henry's law constant at reference temperature, H (atm-m^3/mol)	Henry's law constant reference temperature, T_R (^oC)	Enthalpy of vaporization at the normal boiling point, $\Delta H_{v,b}$ (cal/mol)	Normal boiling point, T_B (^oK)	Critical temperature, T_C (^oK)	Organic carbon partition coefficient, K_{oc} (cm^3/g)	Pure component water solubility, S (mg/L)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
7.90E-02	9.10E-06	1.03E-02	25	7,505	360.36	544.20	1.66E+02	1.47E+03	1.1E-04	4.0E-02

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	10714	0.321	ERROR	ERROR	0.003	9.94E-08	0.998	9.92E-08	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.63E+04	1.06E+06	3.77E-04	15	8,544	5.05E-03	2.17E-01	1.76E-04	1.28E-02	0.00E+00	0.00E+00	5.09E-04	1.23E-02	10714

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.60E+05	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	2.14E-05	5.55E+00	1.1E-04	4.0E-02

END

The predicted groundwater concentration of 1200 ug/L was calculated using the J&E groundwater model and soil gas data. TCE was measured at a concentration of 49,000 ppbv at 336 ft bgs in soil gas. This concentration of TCE was converted to 260,000 ug/m^3, which is the unit for soil gas used in the model. The depth to groundwater is 352 ft bgs. These input parameters were used to predict the concentration of TCE in the groundwater by assuming that the attenuation from 352 to 336 ft was minimal. Therefore the depth of 10729 cm (depth to goundwater 352 ft bgs) to the top of contamination was used in the model but did not make a difference in the C_{source} calculation. Concentrations of TCE were entered until a C_{source} concentration of 260,000 ug/m^3 soil gas was displayed in the intercalcs sheet. Therefore, with the assumption that attenuation from 352 to 336 ft bgs was minimal, the groundwater concentration predicted from soil gas results (from VSG wells 013 and 014 at building 615) is 1200 ug/L based on the results of the J&E model.

APPENDIX G

PARSONS

406 West South Jordan Parkway, Suite 300 • South Jordan, Utah 84095 • (801) 572-5999 • Fax (801) 572-9069

Memorandum

To: **Dean Reynolds, TEAD; Larry McFarland, TEAD**

Copy: **Maryellen Mackenzie, USACE; Carl Cole, USACE; Doug Mackenzie, USACE; Richard Jirik, Parsons; Kurt Alloway, Parsons**

From: **Amanda Evans, Parsons**

Date: **Friday August 26, 2005**

Subject: **TEAD SWMU-58 RFI – Waste Management**

This letter is to recommend disposition of the waste soil in PARSNZ0521701 and PARSNZ0522001 in two roll offs as detailed in Table One, attached. The waste was generated in association with well C-47.

The soils were sampled as IDW60 and tested for TCLP VOCs. Analysis was conducted by Severn Trent Services, Inc, North Canton, Ohio. This laboratory is Utah Certified.

Results have been received as an analytical report and quality control (QC) summary. Parsons has reviewed the data and found the QC to be acceptable. The complete report is attached.

Listed Wastes Analysis:

No constituents were detected.

Therefore it is recommended that waste be treated as non-hazardous with respect to listed codes.

Characteristic Wastes Analysis:

The waste is known to be primarily soil. Therefore generator's reasonable knowledge may be used to exclude the characteristics of ignitability, reactivity and corrosivity.

No constituents were detected. Therefore no characteristic waste codes (40 CFR Part 261.24) should be applied.

Land Disposal Restrictions Analysis:

No constituents were detected (40 CFR Part 268.48), therefore LDRs do not apply.

Disposition:

Since well C-47 is located under a concrete slab east of Lodestone near Bldg 615, Parsons recommends the drill cuttings be transferred to a location recommended by UID personnel.

Parsons will arrange to dispose of the waste per your written instructions.

Table One

Container ID	Owner	Sample?	Sample Comment	Container Size	Source	Contents	Open Date	Close Date	Accumulation Start Date	Disposition Due	Determination	Disposition	Disposition Date
PARSNZ0521701	KLA	YES		20 CU YD	C-47	SOIL	8/5/2005	8/5/2005	8/5/2005	**10/24/2005**			

Sites	Location	Move Date	Manifest ID	Manifest Date
C-47	UID-90	8/5/2005		
	C-47	8/5/2005		

Container ID	Owner	Sample?	Sample Comment	Container Size	Source	Contents	Open Date	Close Date	Accumulation Start Date	Disposition Due	Determination	Disposition	Disposition Date
PARSNZ0522001	KLA	YES		20 CU YD	C-47	SOIL	8/8/2005	8/9/2005	8/8/2005	**10/27/2005**			

Sites	Location	Move Date	Manifest ID	Manifest Date
C-47	UID-90	8/9/2005		
	C-47	8/8/2005		

From: McFarland, Larry [larry.mcfarland@us.army.mil]
Sent: Monday, August 29, 2005 9:11 AM
To: Evans, Amanda
Cc: Alloway, Kurt; Jirik, Richard; Reynolds, Dean (Environmental)
Subject: TEAD IDW-47 and IDW-48F

The Tooele Army Depot (TEAD) Environmental Office has reviewed your memorandum dated August 26, 2005 concerning the recommended disposition of Investigative Derived Waste (IDW) which has been characterized for disposal through sample number IDW-47 and IDW-48F. TEAD concurs with Parsons recommended disposition. As the following containers were generated from the installation of monitoring wells under concrete near building 615, Parsons should dispose of the cuttings in a location to be coordinated with the Utah Industrial Depot.

PARSNZ0522001 (well C-47)
PARSNZ0521701 (well C-47)
PARSNZ0520901 (well C-48F)
PARSNZ0521301 (well C-48F)

Larry McFarland
Environmental Office, SJMTE-CS-EO
1 Tooele Army Depot, Building 8
Tooele, Utah 84074-5003
Phone (435) 833-3235 Fax (435) 833-2839
larry.mcfarland@us.army.mil

SEVERN TRENT STL

STL Sacramento
880 Riverside Parkway
West Sacramento, CA 95605

Tel: 916 373 5600 Fax: 916 372 1059
www.stl-inc.com

August 24, 2005

STL SACRAMENTO PROJECT NUMBER: G5H120304
PO/CONTRACT: 744139-30012

Jan Barbas
Parsons
406 West South Jordan Parkway
Suite 300
South Jordan, UT 84095

Dear Mr. Barbas,

This report contains the analytical results for the sample received under chain of custody by STL Sacramento on August 12, 2005. This sample is associated with your Tooelle project.

The test results in this report meet all NELAC requirements for parameters that accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

Preliminary results were sent via e-mail on August 23, 2005.

If you have any questions, please feel free to call me at (916) 374-4427.

Sincerely,

Nilo Ligi
Project Manager

TABLE OF CONTENTS

STL SACRAMENTO PROJECT NUMBER G5H120304

Case Narrative 1

STL Sacramento Quality Assurance Program 2

Sample Description Information.....3

Chain of Custody Documentation 4

Lot Receipt Checklist.....5

SOLID, 8260B, Vol. Org. TCLP.....8-15
Performed at STL North Canton
Sample: 1
Sample Data Sheet
Method Blank Report
Laboratory QC Reports

CASE NARRATIVE

STL SACRAMENTO PROJECT NUMBER G5H120304

General Comments

Sample was received at 5 degrees Centigrade. It was sent to STL North Canton on 8/13/05 where it was received at 3.9 degrees Centigrade.

SOLID, SW 1311/8260B, TCLP/Volatile Organics

Sample(s): 1

Samples were analysed by method SW 1311/8260B, a TCLP extraction followed by gas chromatography/mass spectrometry (GCMS) analysis. All QA/QC criteria were met.

There were no anomalies associated with this project.

SEVERN TRENT STL

ACCREDITED IN ACCORDANCE WITH nelac

STL Sacramento Certifications/Accreditations

Certifying State	Certificate #	Certifying State	Certificate #
Alaska	UST-055	Oregon*	CA 200005
Arizona	AZ0616	Pennsylvania	68-1272
Arkansas	04-067-0	South Carolina	87014002
California*	01119CA	Texas	TX 270-2004A
Colorado	NA	Utah*	QUAN1
Connecticut	PH-0691	Virginia	00178
Florida*	E87570	Washington	C087
Georgia	960	West Virginia	9930C, 334
Hawaii	NA	Wisconsin	998204680
Louisiana*	01944	NFESC	NA
Michigan	9947	USACE	NA
Nevada	CA44	USDA Foreign Plant	37-82605
New Jersey*	CA005	USDA Foreign Soil	S-46613
New York*	11666		

*NELAP accredited. A more detailed parameter list is available upon request. Update 1/27/05

QC Parameter Definitions

QC Batch: The QC batch consists of a set of up to 20 field samples that behave similarly (i.e., same matrix) and are processed using the same procedures, reagents, and standards at the same time.

Method Blank: An analytical control consisting of all reagents, which may include internal standards and surrogates, and is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD): An aliquot of blank matrix spiked with known amounts of representative target analytes. The LCS (and LCSD as required) is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects. If an LCSD is performed, it may also used to evaluate the precision of the process.

Duplicate Sample (DU): Different aliquots of the same sample are analyzed to evaluate the precision of an analysis.

Surrogates: Organic compounds not expected to be detected in field samples, which behave similarly to target analytes. These are added to every sample within a batch at a known concentration to determine the efficiency of the sample preparation and analytical process.

Matrix Spike and Matrix Spike Duplicate (MS/MSD): An MS is an aliquot of a matrix fortified with known quantities of specific compounds and subjected to an entire analytical procedure in order to indicate the appropriateness of the method for a particular matrix. The percent recovery for the respective compound(s) is then calculated. The MSD is a second aliquot of the same matrix as the matrix spike, also spiked, in order to determine the precision of the method.

Isotope Dilution: For isotope dilution methods, isotopically labeled analogs (internal standards) of the native target analytes are spiked into the sample at time of extraction. These internal standards are used for quantitation, and monitor and correct for matrix effects. Since matrix effects on method performance can be judged by the recovery of these analogs, there is little added benefit of performing MS/MSD for these methods. MS/MSD are only performed for client or QAPP requirements.

Control Limits: The reported control limits are either based on laboratory historical data, method requirements, or project data quality objectives. The control limits represent the estimated uncertainty of the test results.

Sample Summary
G5H120304

WO#	Sample #	Client Sample ID	Sampling Date	Received Date
HHGE8	1	IDW60	8/10/2005 03:30 PM	8/12/2005 08:50 AM

Notes(s):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity, pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight

G5H120304

CHAIN OF CUSTODY

PARSONS

COC ID: 1021

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
	IDW60	IDW60	SD	G	N	1	10 AUG 2005	1530	KLA	0	380	2

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
TCLPVOC	SVLS		2			

Remarks:
PARSN20521701 AND
PARSN20522001
C-47F

5 DAY TURN-AROUND REQUESTED

RECEIVED IN GOOD CONDITION
UNDER COC
AUG 12 2005
INI

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
To: FED EX	11 AUG 2005 / 1400		8-12-05 1100

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Wednesday, August 10, 2005

STL-Sacramento (916) 373-5600

Severn Trent Laboratories, Inc
SAMPLE ANALYSIS REQUISITION

LABORATORY: STL N Canton
4101 Shuffel Drive NW
North Canton OH 44720,

NEED ANALYTICAL REPORT BY
8/25/05

J 9w 8/15/05

QM C-250 8/13/05 Printed MS & TCLP Sheets 2 x 250

ATTN:

LAB PURCHASE ORDER: SR071579

CLIENT CODE: 368391 PROJECT MANAGER: Nilo Ligi

NUMBER OF SAMPLES IN LOT: 0001

SAMPLE I.D.	SAMPLING DATE	ANALYSIS REQUIRED
G5H120304-001	8/10/05	Volatile Organics, GC/MS (8260B)
HHGE8-1-AA		(MS8260TP) METHOD: 8260B

NEED DETECTION LIMIT AND ANALYSIS DATE INCLUDED IN REPORT.

SHIPPING METHOD: FEDEX DATE: 8/12/05

SEND REPORT TO: NILO LIGI

SAMPLE RECEIVED BY: _____ DATE: _____

PLEASE SEND A SIGNED COPY OF THIS FORM WITH REPORT AT COMPLETION OF ANALYSIS.

THANK YOU.

STL Sacramento
INT: _____ 8/12/05 14:30:24
STL N Canton
4101 Shuffel Drive NW
North Canton OH 44720,

RELINQUISHED BY: [signature] DATE/TIME: 8-12-05 15:00

RELINQUISHED BY: _____ DATE/TIME: _____

RECEIVED FOR LAB BY: [signature] DATE/TIME: 8-13-05 9:20

PLEASE RETURN ORIGINAL SAMPLE ANALYSIS REQUISITION

SEVERN TRENT STL

LOT RECEIPT CHECKLIST
STL Sacramento

CLIENT Parsons PM MC LOG # 34045

LOT# (QUANTIMS ID) G5H120304 QUOTE# 62857 LOCATION NC

	Initials	Date
DATE RECEIVED 8-12-05 TIME RECEIVED 850	CH	8-12-05

DELIVERED BY ☑ FEDEX ☐ CA OVERNIGHT ☐ CLIENT
☐ AIRBORNE ☐ GOLDENSTATE ☐ DHL
☐ UPS ☐ BAX GLOBAL ☐ GO-GETTERS
☐ STL COURIER ☐ COURIERS ON DEMAND
☐ OTHER

CUSTODY SEAL STATUS ☑ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S) Seal

SHIPPPING CONTAINER(S) ☑ STL ☐ CLIENT ☐ N/A

TEMPERTURE RECORD (IN °C) IR 1 ☑ 3 ☐ ☐ OTHER _____

COC #(S) 1021

TEMPERATURE BLANK Observed: 5 Corrected: _____
CH 8-12-05

SAMPLE TEMPERATURE
Observed: 5 5 Average: 5 Corrected Average: 5

COLLECTOR'S NAME: ☐ Verified from COC ☑ Not on COC

pH MEASURED ☐ YES ☐ ANOMALY ☑ N/A

LABELED BY.....

LABELS CHECKED BY.....

PEER REVIEW _____ ☐ N/A

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING
WETCHEM ☑ N/A
VOA-ENCORES ☑ N/A

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☑ N/A

☑ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A

☐ Clouseau ☐ TEMPERATURE EXCEEDED (2 °C – 6 °C)*1 ☑ N/A

☐ WET ICE ☐ BLUE ICE ☐ GEL PACK ☐ NO COOLING AGENTS USED ☐ PM NOTIFIED

Notes: _____

*1 Acceptable temperature range for State of Wisconsin samples is ≤ 4°C.

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES.

STL Cooler Receipt Form/Narrative **Lot Number:** G5H120304
North Canton Facility

Client: STL Sacramento Project: _____ Quote#: _____
Cooler Received on: 8-13-05 Opened on: 8-13-05 by: Lisa Lewis (Signature)

Fedx ☒ Client Drop Off ☐ UPS ☐ DHL ☐ FAS ☐ Other: _____
STL Cooler No# STL-SAC Foam Box ☐ Client Cooler ☐ Other ____

1. Were custody seals on the outside of the cooler? Yes ☒ No ☐ Intact? Yes ☒ No ☐ NA ☐
   If YES, Quantity 1
   Were the custody seals signed and dated? Yes ☒ No ☐ NA ☐
2. Shipper's packing slip attached to this form? Yes ☒ No ☐ NA ☐
3. Did custody papers accompany the samples? Yes ☒ No ☐ Relinquished by client? Yes ☒ No ☐
4. Did you sign the custody papers in the appropriate place? Yes ☒ No ☐
5. Packing material used: Bubble Wrap ☒ Foam ☐ None ☐ Other: _____
6. Cooler temperature upon receipt 3.9 °C (see back of form for multiple coolers/temp)

METHOD: Temp Vial ☐ Coolant & Sample ☐ Against Bottles ☐ IR ☒ ICE/H_2O Slurry ☐
COOLANT: Wet Ice ☒ Blue Ice ☐ Dry Ice ☐ Water ☐ None ☐

7. Did all bottles arrive in good condition (Unbroken)? Yes ☒ No ☐
8. Could all bottle labels and/or tags be reconciled with the COC? Yes ☒ No ☐
9. Were samples at the correct pH? (record below/on back) Yes ☐ No ☐ NA ☒
10. Were correct bottles used for the tests indicated? Yes ☒ No ☐
11. Were air bubbles >6 mm in any VOA vials? Yes ☐ No ☐ NA ☒
12. Sufficient quantity received to perform indicated analyses? Yes ☒ No ☐

Contacted PM _____ Date: _____ by: _____ via Voice Mail ☐ Verbal ☐ Other ☐
Concerning: _____

√	

1. CHAIN OF CUSTODY

The following discrepancies occurred:

2. SAMPLE CONDITION

Sample(s) _____ were received after the recommended holding time had expired.
Sample(s) _____ were received in a broken container.

3. SAMPLE PRESERVATION

Sample(s) _____ were further preserved in sample receiving to meet recommended pH level(s). *Nitric Acid Lot # 051105-HNO3; Sulfuric Acid Lot # 102804-H2SO4; Sodium Hydroxide Lot # -041305 -NaOH; Hydrochloric Acid Lot # 100504-HCl; Sodium Hydroxide and Zinc Acetate Lot # 071604-CH3COO2ZN/NaOH*
Sample(s) _____ were received with bubble > 6 mm in diameter (cc: PM)

4. Other (see below or back)

Client ID	pH	Date	Initials

SOP: NC-SC-0005, Sample Receiving
N:\QAQC\NARRATIV\STL\Cooler Receipt STL\COOLER_STL_Rev49 062205.doc

SOLID, 8260B, Vol. Org. TCLP NCanton

Parsons Corporation

Client Sample ID: IDW60

TCLP GC/MS Volatiles

Lot-Sample #...: G5H120304-001 **Work Order #...:** HHGE81AA **Matrix.....:** SD
Date Sampled...: 08/10/05 **Date Received..:** 08/12/05
Leach Date.....: 08/16/05 **Prep Date.....:** 08/17/05 **Analysis Date..:** 08/17/05
Leach Batch #..: P522808 **Prep Batch #...:** 5229343
Dilution Factor: 1

Method.....: SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	0.025	mg/L	0.00023
Carbon tetrachloride	ND	0.025	mg/L	0.00045
Chlorobenzene	ND	0.025	mg/L	0.00028
Chloroform	ND	0.025	mg/L	0.00040
1,2-Dichloroethane	ND	0.025	mg/L	0.00048
1,1-Dichloroethylene	ND	0.070	mg/L	0.00060
Methyl ethyl ketone	ND	0.25	mg/L	0.0010
Tetrachloroethylene	ND	0.070	mg/L	0.00083
Trichloroethylene	ND	0.050	mg/L	0.00041
Vinyl chloride	ND	0.025	mg/L	0.00044

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	90	(86 - 125)
1,2-Dichloroethane-d4	98	(80 - 122)
Toluene-d8	101	(90 - 122)
4-Bromofluorobenzene	102	(84 - 125)

NOTE(S):

Analysis performed in accordance with USEPA Toxicity Characteristic Leaching Procedure Method 1311

QC DATA ASSOCIATION SUMMARY

G5H120304

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	SD	SW846 8260B	P522808	5229343	5229221

METHOD BLANK REPORT

TCLP GC/MS Volatiles

Client Lot #...: G5H120304 **Work Order #...:** HHK5L1AA **Matrix.....:** SOLID
MB Lot-Sample #: A5H160000-257
Leach Date.....: 08/16/05 **Prep Date.....:** 08/17/05 **Analysis Date..:** 08/17/05
Leach Batch #..: P522808 **Prep Batch #...:** 5229343
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Benzene	ND	0.025	mg/L	SW846 8260B
Carbon tetrachloride	ND	0.025	mg/L	SW846 8260B
Chlorobenzene	ND	0.025	mg/L	SW846 8260B
Chloroform	ND	0.025	mg/L	SW846 8260B
1,2-Dichloroethane	ND	0.025	mg/L	SW846 8260B
1,1-Dichloroethylene	ND	0.070	mg/L	SW846 8260B
Methyl ethyl ketone	ND	0.25	mg/L	SW846 8260B
Tetrachloroethylene	ND	0.070	mg/L	SW846 8260B
Trichloroethylene	ND	0.050	mg/L	SW846 8260B
Vinyl chloride	ND	0.025	mg/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	87	(86 - 125)
1,2-Dichloroethane-d4	93	(80 - 122)
Toluene-d8	97	(90 - 122)
4-Bromofluorobenzene	102	(84 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: G5H120304 **Work Order #...:** HHNRQ1AA **Matrix.....:** WASTE
LCS Lot-Sample#: A5H170000-343
Prep Date.....: 08/17/05 **Analysis Date..:** 08/17/05
Prep Batch #...: 5229343
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
Benzene	**97**	**(76 - 118)**	**SW846 8260B**
Chlorobenzene	**99**	**(76 - 113)**	**SW846 8260B**
1,1-Dichloroethylene	**98**	**(67 - 128)**	**SW846 8260B**
Trichloroethylene	**96**	**(76 - 119)**	**SW846 8260B**
Toluene	**101**	**(72 - 117)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	95	(86 - 124)
1,2-Dichloroethane-d4	101	(80 - 122)
Toluene-d8	101	(90 - 122)
4-Bromofluorobenzene	108	(84 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: G5H120304 **Work Order #...:** HHNRQ1AA **Matrix.....:** WASTE
LCS Lot-Sample#: A5H170000-343
Prep Date.....: 08/17/05 **Analysis Date..:** 08/17/05
Prep Batch #...: 5229343
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	METHOD
Benzene	**0.500**	**0.484**	**mg/L**	**97**	**SW846 8260B**
Chlorobenzene	**0.500**	**0.493**	**mg/L**	**99**	**SW846 8260B**
1,1-Dichloroethylene	**0.500**	**0.489**	**mg/L**	**98**	**SW846 8260B**
Trichloroethylene	**0.500**	**0.482**	**mg/L**	**96**	**SW846 8260B**
Toluene	**0.500**	**0.507**	**mg/L**	**101**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	95	(86 - 124)
1,2-Dichloroethane-d4	101	(80 - 122)
Toluene-d8	101	(90 - 122)
4-Bromofluorobenzene	108	(84 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

TCLP GC/MS Volatiles

Client Lot #...:	G5H120304	**Work Order #...:**	HHC321CV-MS	**Matrix.....:**	WASTE
MS Lot-Sample #:	A5H110258-001		HHC321CW-MSD		
Date Sampled...:	08/10/05	**Date Received..:**	08/11/05		
Leach Date.....:	08/16/05	**Prep Date.....:**	08/17/05	**Analysis Date..:**	08/17/05
Leach Batch #..:	P522808	**Prep Batch #...:**	5229343		
Dilution Factor:	1				

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**98**	**(76 - 117)**			**SW846 8260B**
	98	**(76 - 117)**	**0.41**	**(0-30)**	**SW846 8260B**
Chlorobenzene	**100**	**(72 - 114)**			**SW846 8260B**
	101	**(72 - 114)**	**1.3**	**(0-30)**	**SW846 8260B**
1,1-Dichloroethylene	**102**	**(67 - 129)**			**SW846 8260B**
	107	**(67 - 129)**	**4.4**	**(0-30)**	**SW846 8260B**
Trichloroethylene	**98**	**(72 - 121)**			**SW846 8260B**
	100	**(72 - 121)**	**2.1**	**(0-30)**	**SW846 8260B**
Toluene	**103**	**(67 - 113)**			**SW846 8260B**
	103	**(67 - 113)**	**0.21**	**(0-30)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	94	(86 - 125)
	91	(86 - 125)
1,2-Dichloroethane-d4	103	(80 - 122)
	101	(80 - 122)
Toluene-d8	106	(90 - 122)
	103	(90 - 122)
4-Bromofluorobenzene	108	(84 - 125)
	109	(84 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE DATA REPORT

TCLP GC/MS Volatiles

Client Lot #...: G5H120304 **Work Order #...:** HHC321CV-MS **Matrix.....:** WASTE
MS Lot-Sample #: A5H110258-001 HHC321CW-MSD
Date Sampled...: 08/10/05 **Date Received..:** 08/11/05
Leach Date.....: 08/16/05 **Prep Date.....:** 08/17/05 **Analysis Date..:** 08/17/05
Leach Batch #..: P522808 **Prep Batch #...:** 5229343
Dilution Factor: 1

PARAMETER	SAMPLE AMOUNT	SPIKE AMT	MEASRD AMOUNT	UNITS	PERCNT RECVRY	RPD	METHOD
Benzene	**ND**	**0.500**	**0.490**	**mg/L**	**98**		**SW846 8260B**
	ND	**0.500**	**0.492**	**mg/L**	**98**	**0.41**	**SW846 8260B**
Chlorobenzene	**ND**	**0.500**	**0.500**	**mg/L**	**100**		**SW846 8260B**
	ND	**0.500**	**0.507**	**mg/L**	**101**	**1.3**	**SW846 8260B**
1,1-Dichloroethylene	**ND**	**0.500**	**0.510**	**mg/L**	**102**		**SW846 8260B**
	ND	**0.500**	**0.533**	**mg/L**	**107**	**4.4**	**SW846 8260B**
Trichloroethylene	**ND**	**0.500**	**0.491**	**mg/L**	**98**		**SW846 8260B**
	ND	**0.500**	**0.502**	**mg/L**	**100**	**2.1**	**SW846 8260B**
Toluene	**ND**	**0.500**	**0.514**	**mg/L**	**103**		**SW846 8260B**
	ND	**0.500**	**0.513**	**mg/L**	**103**	**0.21**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Dibromofluoromethane	94	(86 - 125)
	91	(86 - 125)
1,2-Dichloroethane-d4	103	(80 - 122)
	101	(80 - 122)
Toluene-d8	106	(90 - 122)
	103	(90 - 122)
4-Bromofluorobenzene	108	(84 - 125)
	109	(84 - 125)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

APPENDIX H

PARSONS

406 West South Jordan Parkway, Suite 300 • South Jordan, Utah 84095 • (801) 572-5999 • Fax (801) 572-9069

Memorandum

To: **Dean Reynolds, TEAD; Larry McFarland, TEAD**

Copy: **Maryellen Mackenzie, USACE; Carl Cole, USACE; Doug Mackenzie, USACE; Richard Jirik, Parsons; Kurt Alloway, Parsons**

From: **Amanda Evans, Parsons**

Date: **Friday, September 2, 2005**

Subject: **TEAD SWMU-58 RFI – Waste Management**

This letter is to recommend disposition of the waste equipment rinsate and drill produced water in Baker Tank PARSNZ0520801 as detailed in Table One, attached.

The equipment rinsate and drill produced water was sampled as IDW61 and tested for VOCs. Analysis was conducted by Severn Trent Services, Inc, West Sacramento, CA. This laboratory is Utah Certified.

Results have been received as an analytical report and quality control (QC) summary. Parsons has reviewed the data and found the QC to be acceptable. The complete report is attached.

Listed Wastes Analysis:

Naphthalene was detected at 0.31 ug/L, toluene at 0.44 ug/L and trichloroethylene at 48 ug/L. Therefore it is recommended that the waste be treated as hazardous and coded F001 and F005. Also, chloroform was detected at 0.13 ug/L. No additional waste codes are recommended due to chloroform.

Characteristic Wastes Analysis:

The waste is known to be primarily water. Therefore generator's reasonable knowledge may be used to exclude the characteristics of ignitability, reactivity and corrosivity.

No analytes were detected in excess of TCLP limits. Therefore no characteristic waste codes (40 CFR Part 261.24) should be applied.

Land Disposal Restrictions Analysis:

No compounds were detected in excess of LDR limits for wastewater (40 CFR Part 268.48), therefore the waste is suitable for land disposal.

Disposition:

It is recommended that the equipment rinsate and drill produced water be sent to Clean Harbors and landfilled under the active profile number: CH91899B. No additional profile sampling will be required if this facility is utilized. Parsons will arrange to dispose of the waste per your written instructions.

Table One

Container ID	Owner	Sample?	Sample Comment	Container Size	Source	Contents	Open Date	Close Date	Accumulation Start Date	Disposition Due	Determination	Disposition	Disposition Date
PARSNZ0520801	KLA	YES		6500 GAL	C-45, C-47, C-48F	PURGE WATER, DECON WATER	7/27/2005	8/18/2005	7/27/2005	**10/15/2005**			

Sites	Location	Move Date	Manifest ID	Manifest Date
C-45	UID-90	7/27/2005		
C-47				
C-48				
UID				

From: McFarland, Larry [larry.mcfarland@us.army.mil]
Sent: Wednesday, September 07, 2005 3:23 PM
To: Evans, Amanda
Cc: Alloway, Kurt; Dean Reynolds (TEAD)
Subject: RE: TEAD IDW Report for IDW61
Amanda,

The Tooele Army Depot (TEAD) Environmental Office has reviewed your memorandum dated September 2, 2005 concerning the recommended disposition of Investigative Derived Waste (IDW) which has been characterized for disposal through sample number IDW-61. TEAD concurs with Parsons recommended disposition. Water contained in the Baker Tank (PARSNZ0520801) should be disposed of off-site as recommended by Parsons as soon as possible. A copy of the shipping documents should be provided to TEAD for review prior to pickup by the transporter.

Larry McFarland
Environmental Office, SJMTE-CS-EO
1 Tooele Army Depot, Building 8
Tooele, Utah 84074-5003
Phone (435) 833-3235 Fax (435) 833-2839
larry.mcfarland@us.army.mil

-----Original Message-----
From: Evans, Amanda [mailto:Amanda.Evans@parsons.com]
Sent: Friday, September 02, 2005 10:54 AM
To: Kurt.Alloway@parsons.com; colec@emh2.tooele.army.mil; doug.d.mackenzie@usace.army.mil; Richard.Jirik@parsons.com; Maryellen.Mackenzie@usace.army.mil; mcfarlal@emh2.tooele.army.mil; reynoldd@emh2.tooele.army.mil
Subject: TEAD IDW Report for IDW61

Hello,

You will find attached the reports for IDW61. Please contact me if you have any questions or comments.

Thank you,

Amanda M. Evans
Chemist
parsons
406 West South Jordan Parkway, Suite 300
South Jordan, UT 84095
(801)553-3366
(801)572-9069 Fax

<<AME_idw61.pdf>>

SEVERN TRENT STL

STL Sacramento
880 Riverside Parkway
West Sacramento, CA 95605

Tel: 916 373 5600 Fax: 916 372 1059
www.stl-inc.com

August 29, 2005

STL SACRAMENTO PROJECT NUMBER: G5H240240
PO/CONTRACT: 744139-30012

Jan Barbas
Parsons
406 West South Jordan Parkway
Suite 300
South Jordan, UT 84095

Dear Mr. Barbas,

This report contains the analytical results for the sample received under chain of custody by STL Sacramento on August 24, 2005. This sample is associated with your Tooelle IDW project.

The test results in this report meet all NELAC requirements for parameters that accreditation is required or available. Any exceptions to NELAC requirements are noted in the case narrative. The case narrative is an integral part of this report.

Preliminary results were sent via e-mail on August 29, 2005.

If you have any questions, please feel free to call me at (916) 374-4427.

Sincerely,

Nilo Ligi
Project Manager

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STL SACRAMENTO PROJECT NUMBER G5H240240

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STL Sacramento Quality Assurance Program 2

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Lot Receipt Checklist.....5

WATER, 8260B, Volatile Organics..... 6-252
Sample: 1
Sample Data Sheet
Method Blank Report
Laboratory QC Reports
Full Data Package

CASE NARRATIVE

STL SACRAMENTO PROJECT NUMBER G5H240240

General Comments

Sample: 1

Sample was received in good condition at STL Sacramento at 4 degrees C.

Water, SW 8260B, Volatile Organics

Sample(s): 1

Sample was analysed by method SW 8260B, gas chromatography/mass spectrometry (GCMS) analysis. All QA/QC criteria were met except as noted below.

Sample(s): 1

Insufficient volume was available for MS/MSD. An LCS/DCS was prepared instead.

There were no anomalies associated with this project.

SEVERN TRENT STL

ACCREDITED IN ACCORDANCE WITH nelac

STL Sacramento Certifications/Accreditations

Certifying State	Certificate #	Certifying State	Certificate #
Alaska	UST-055	Oregon*	CA 200005
Arizona	AZ0616	Pennsylvania	68-1272
Arkansas	04-067-0	South Carolina	87014002
California*	01119CA	Texas	TX 270-2004A
Colorado	NA	Utah*	QUAN1
Connecticut	PH-0691	Virginia	00178
Florida*	E87570	Washington	C087
Georgia	960	West Virginia	9930C, 334
Hawaii	NA	Wisconsin	998204680
Louisiana*	01944	NFESC	NA
Michigan	9947	USACE	NA
Nevada	CA44	USDA Foreign Plant	37-82605
New Jersey*	CA005	USDA Foreign Soil	S-46613
New York*	11666		

*NELAP accredited. A more detailed parameter list is available upon request. Update 1/27/05

QC Parameter Definitions

QC Batch: The QC batch consists of a set of up to 20 field samples that behave similarly (i.e., same matrix) and are processed using the same procedures, reagents, and standards at the same time.

Method Blank: An analytical control consisting of all reagents, which may include internal standards and surrogates, and is carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

Laboratory Control Sample and Laboratory Control Sample Duplicate (LCS/LCSD): An aliquot of blank matrix spiked with known amounts of representative target analytes. The LCS (and LCSD as required) is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects. If an LCSD is performed, it may also used to evaluate the precision of the process.

Duplicate Sample (DU): Different aliquots of the same sample are analyzed to evaluate the precision of an analysis.

Surrogates: Organic compounds not expected to be detected in field samples, which behave similarly to target analytes. These are added to every sample within a batch at a known concentration to determine the efficiency of the sample preparation and analytical process.

Matrix Spike and Matrix Spike Duplicate (MS/MSD): An MS is an aliquot of a matrix fortified with known quantities of specific compounds and subjected to an entire analytical procedure in order to indicate the appropriateness of the method for a particular matrix. The percent recovery for the respective compound(s) is then calculated. The MSD is a second aliquot of the same matrix as the matrix spike, also spiked, in order to determine the precision of the method.

Isotope Dilution: For isotope dilution methods, isotopically labeled analogs (internal standards) of the native target analytes are spiked into the sample at time of extraction. These internal standards are used for quantitation, and monitor and correct for matrix effects. Since matrix effects on method performance can be judged by the recovery of these analogs, there is little added benefit of performing MS/MSD for these methods. MS/MSD are only performed for client or QAPP requirements.

Control Limits: The reported control limits are either based on laboratory historical data, method requirements, or project data quality objectives. The control limits represent the estimated uncertainty of the test results.

Sample Summary
G5H240240

WO#	Sample #	Client Sample ID	Sampling Date	Received Date
HH53T	1	IDW61	8/23/2005 02:05 PM	8/24/2005 09:05 AM

Notes(s):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity, pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight

CHAIN OF CUSTODY

PARSONS

COC ID: 1022

Project Name:	Tooele Industrial Area	**Contractor:**	Parsons-SLC
Project Manager:	Ed Staes	**Installation:**	TEAD
Sample Coordinator:	Kurt Alloway	**Sample Program:**	

Parsons Point of Contact: Jan Barbas
406 W. South Jordan Parkway
Suite 300
South Jordan, Utah 84095
(801) 572-5999 FAX (801) 572-9069

Site ID	Location ID	Sample ID	Matrix	Method	Type	Sample No.	Log Date	Log Time	Logged By	Beg. Depth	End. Depth	Total Conts.
	IDW61	IDW61	WW	G	N	1	23AUG05	1405	KGA	—	—	3

Analysis	Lab	Cooler	No. Conts	AB Lot	EB Lot	TB Lot
VOC	SVLS	1	3			

Remarks: PARSN20520801

5 DAY TURN-AROUND REQUESTED

Relinquished by (Signature)	Date/Time	Received by (Signature)	Date/Time
	23AUG05 / 1500		8/24/05 1005

To:STL Laboratories, 880 Riverside Pkwy, W. Sacramento, CA, 95605 (916) 373-5600

Thursday, August 18, 2005

SEVERN TRENT STL

LOT RECEIPT CHECKLIST
STL Sacramento

CLIENT Parsons PM NL LOG # 34227

LOT# (QUANTIMS ID) G5H240240 QUOTE# 62837 LOCATION VB

	Initials	Date
DATE RECEIVED 8/24/05 TIME RECEIVED 0905	CN	8/24/05

DELIVERED BY ☒ FEDEX ☐ CA OVERNIGHT ☐ CLIENT
☐ AIRBORNE ☐ GOLDENSTATE ☐ DHL
☐ UPS ☐ BAX GLOBAL ☐ GO-GETTERS
☐ STL COURIER ☐ COURIERS ON DEMAND
☐ OTHER

CUSTODY SEAL STATUS ☒ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S) See 1

SHIPPPING CONTAINER(S) ☒ STL ☐ CLIENT ☐ N/A

TEMPERTURE RECORD (IN °C) IR 1 ☒ 3 ☐ ☐ OTHER _____

COC #(S) N/A

TEMPERATURE BLANK Observed: N/A Corrected: N/A

SAMPLE TEMPERATURE

Observed: 5 5 3 Average: 4 Corrected Average: 4

COLLECTOR'S NAME: ☐ Verified from COC ☒ Not on COC

pH MEASURED ☐ YES ☐ ANOMALY ☒ N/A

LABELED BY.....

LABELS CHECKED BY.....

PEER REVIEW _____ ☒ NA

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING
WETCHEM ☒ N/A
VOA-ENCORES ☒ N/A

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☒ N/A

☒ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A

☐ Clouseau ☐ TEMPERATURE EXCEEDED (2 °C – 6 °C)*1 ☒ N/A

☐ WET ICE ☐ BLUE ICE ☐ GEL PACK ☐ NO COOLING AGENTS USED ☐ PM NOTIFIED

Notes: _____

*1 Acceptable temperature range for State of Wisconsin samples is ≤ 4°C.

WATER, 8260B, Volatile Organics

Parsons Corporation

Client Sample ID: IDW61

GC/MS Volatiles

Lot-Sample #...: G5H240240-001 **Work Order #...:** HH53T1AA **Matrix.....:** WATER
Date Sampled...: 08/23/05 **Date Received..:** 08/24/05
Prep Date.....: 08/25/05 **Analysis Date..:** 08/25/05
Prep Batch #...: 5238494
Dilution Factor: 1 **Method.....:** SW846 8260B

PARAMETER	RESULT	REPORTING LIMIT	UNITS	MDL
Benzene	ND	1.0	ug/L	0.13
Carbon tetrachloride	ND	1.0	ug/L	0.15
Chloroethane	ND	1.0	ug/L	0.34
Chloroform	**0.13 J**	**1.0**	**ug/L**	**0.12**
1,1-Dichloroethane	ND	1.0	ug/L	0.10
1,2-Dichloroethane	ND	1.0	ug/L	0.22
cis-1,2-Dichloroethene	ND	1.0	ug/L	0.10
trans-1,2-Dichloroethene	ND	1.0	ug/L	0.11
1,1-Dichloroethene	ND	1.0	ug/L	0.36
1,2-Dichloropropane	ND	1.0	ug/L	0.15
Ethylbenzene	ND	1.0	ug/L	0.27
Methylene chloride	ND	2.0	ug/L	0.35
Naphthalene	**0.31 J**	**1.0**	**ug/L**	**0.15**
Tetrachloroethene	ND	1.0	ug/L	0.38
Toluene	**0.44 J**	**1.0**	**ug/L**	**0.25**
1,1,1-Trichloroethane	ND	1.0	ug/L	0.41
1,1,2-Trichloroethane	ND	1.0	ug/L	0.31
Trichloroethene	**48**	**1.0**	**ug/L**	**0.31**
Vinyl chloride	ND	1.0	ug/L	0.12
m-Xylene & p-Xylene	ND	1.0	ug/L	0.18
o-Xylene	ND	1.0	ug/L	0.10

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	96	(70 - 130)
1,2-Dichloroethane-d4	111	(70 - 130)
Toluene-d8	105	(70 - 130)
Dibromofluoromethane	109	(70 - 130)

NOTE(S):

J Estimated result. Result is less than RL.

QC DATA ASSOCIATION SUMMARY

G5H240240

Sample Preparation and Analysis Control Numbers

SAMPLE#	MATRIX	ANALYTICAL METHOD	LEACH BATCH #	PREP BATCH #	MS RUN#
001	WATER	SW846 8260B		5238494	

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: G5H240240 **Work Order #...:** HJDWM1AA **Matrix.....:** WATER
MB Lot-Sample #: G5H260000-494

Prep Date.....: 08/25/05
Analysis Date..: 08/25/05 **Prep Batch #...:** 5238494
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Benzene	ND	1.0	ug/L	SW846 8260B
Carbon tetrachloride	ND	1.0	ug/L	SW846 8260B
Chloroethane	ND	1.0	ug/L	SW846 8260B
Chloroform	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,2-Dichloroethane	ND	1.0	ug/L	SW846 8260B
1,1-Dichloroethene	ND	1.0	ug/L	SW846 8260B
cis-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
trans-1,2-Dichloroethene	ND	1.0	ug/L	SW846 8260B
1,2-Dichloropropane	ND	1.0	ug/L	SW846 8260B
Ethylbenzene	ND	1.0	ug/L	SW846 8260B
Methylene chloride	ND	2.0	ug/L	SW846 8260B
Naphthalene	ND	1.0	ug/L	SW846 8260B
Tetrachloroethene	ND	1.0	ug/L	SW846 8260B
Toluene	ND	1.0	ug/L	SW846 8260B
1,1,1-Trichloroethane	ND	1.0	ug/L	SW846 8260B
1,1,2-Trichloroethane	ND	1.0	ug/L	SW846 8260B
Trichloroethene	ND	1.0	ug/L	SW846 8260B
Vinyl chloride	ND	1.0	ug/L	SW846 8260B
o-Xylene	ND	1.0	ug/L	SW846 8260B
m-Xylene & p-Xylene	ND	1.0	ug/L	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	96	(70 - 130)
1,2-Dichloroethane-d4	112	(70 - 130)
Toluene-d8	103	(70 - 130)
Dibromofluoromethane	108	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE DATA REPORT

GC/MS Volatiles

Client Lot #...: G5H240240 **Work Order #...:** HJDWM1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: G5H260000-494 HJDWM1AD-LCSD
Prep Date.....: 08/25/05 **Analysis Date..:** 08/25/05
Prep Batch #...: 5238494
Dilution Factor: 1

PARAMETER	SPIKE AMOUNT	MEASURED AMOUNT	UNITS	PERCENT RECOVERY	RPD	METHOD
Chlorobenzene	**20.0**	**19.4**	**ug/L**	**97**		**SW846 8260B**
	20.0	**17.9**	**ug/L**	**90**	**8.0**	**SW846 8260B**
Benzene	**20.0**	**19.3**	**ug/L**	**96**		**SW846 8260B**
	20.0	**17.9**	**ug/L**	**90**	**7.2**	**SW846 8260B**
1,1-Dichloroethene	**20.0**	**20.1**	**ug/L**	**101**		**SW846 8260B**
	20.0	**17.9**	**ug/L**	**90**	**11**	**SW846 8260B**
Toluene	**20.0**	**18.9**	**ug/L**	**94**		**SW846 8260B**
	20.0	**17.5**	**ug/L**	**88**	**7.4**	**SW846 8260B**
Trichloroethene	**20.0**	**18.9**	**ug/L**	**95**		**SW846 8260B**
	20.0	**17.4**	**ug/L**	**87**	**8.4**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	99	(70 - 130)
	97	(70 - 130)
1,2-Dichloroethane-d4	106	(70 - 130)
	109	(70 - 130)
Toluene-d8	103	(70 - 130)
	106	(70 - 130)
Dibromofluoromethane	105	(70 - 130)
	106	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: G5H240240 **Work Order #...:** HJDWM1AC-LCS **Matrix.....:** WATER
LCS Lot-Sample#: G5H260000-494 HJDWM1AD-LCSD
Prep Date.....: 08/25/05 **Analysis Date..:** 08/25/05
Prep Batch #...: 5238494
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Chlorobenzene	**97**	**(80 - 120)**			**SW846 8260B**
	90	**(80 - 120)**	**8.0**	**(0-30)**	**SW846 8260B**
Benzene	**96**	**(80 - 120)**			**SW846 8260B**
	90	**(80 - 120)**	**7.2**	**(0-30)**	**SW846 8260B**
1,1-Dichloroethene	**101**	**(80 - 120)**			**SW846 8260B**
	90	**(80 - 120)**	**11**	**(0-30)**	**SW846 8260B**
Toluene	**94**	**(80 - 120)**			**SW846 8260B**
	88	**(80 - 120)**	**7.4**	**(0-30)**	**SW846 8260B**
Trichloroethene	**95**	**(80 - 120)**			**SW846 8260B**
	87	**(80 - 120)**	**8.4**	**(0-30)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
4-Bromofluorobenzene	99	(70 - 130)
	97	(70 - 130)
1,2-Dichloroethane-d4	106	(70 - 130)
	109	(70 - 130)
Toluene-d8	103	(70 - 130)
	106	(70 - 130)
Dibromofluoromethane	105	(70 - 130)
	106	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

WASTE MATERIAL PROFILE SHEET

Clean Harbors Profile No. CH91899B

A. GENERAL INFORMATION

GENERATOR EPA ID # *UT3213820894*
GENERATOR CODE (Assigned by Clean Harbors) *TO0469*
ADDRESS *Tooele Army Depot*

GENERATOR PROFILE No. **CH91899B**
GENERATOR NAME *Tooele Army Depot*
CITY *Tooele* STATE *UT* ZIP *84074*
PHONE:

CUSTOMER CODE (Assigned by Clean Harbors) *PAR1392*
ADDRESS *406 W South Jordan Parkway Suite 300*

CUSTOMER NAME: *Parsons Engineering Science In*
CITY *South Jordan* STATE *UT* ZIP *84095*

B. WASTE DESCRIPTION

WASTE DESCRIPTION: *PURGE AND DECON WATER*

PROCESS GENERATING WASTE (Please provide detailed description of process generating waste):
DRILLING AND PURGEING WELLS

C. PHYSICAL PROPERTIES (at 25C or 77F)

PHYSICAL STATE
- SOLID WITHOUT FREE LIQUID
- POWDER
- MONOLITHIC SOLID
- ☑ LIQUID WITH NO SOLIDS
- LIQUID/SOLID MIXTURE
  - % FREE LIQUID
  - % SETTLED SOLID
  - % TOTAL SUSPENDED SOLI
- SLUDGE
- GAS/AEROSOL

NUMBER OF PHASES/LAYERS
☑ 1 2 3
% BY VOLUME (Approx.)
TOP
MIDDLE
BOTTOM

VISCOSITY (If liquid present)
☑ 1 - 100 (e.g. WATER)
101 - 500 (e.g. MOTOR OIL)
501 - 10,000 (e.g. MOLASSES)
> 10,000

COLOR
CLEAR

ODOR
☑ NONE
MILD
STRONG
Describe:

BOILING POINT
<= 95 °F
> 95 °F
101 - 129 °F
☑ >= 130 °F

MELTING POINT
< 140 °F
140-200 °F
> 200 °F

TOTAL ORGANIC CARBON
☑ <= 1%
1-9%
>= 10%

FLASH POINT
< 73 °F
73 - 100 °F
101 -140 °F
141 -200 °F
☑ > 200 °F
Actual:

pH
<= 2
2.1 - 6.9
☑ 7 (Neutral)
7.1 - 12.4
>= 12.5
Actual:

SPECIFIC GRAVITY
< 0.8 (e.g. Gasoline)
0.8-1.0 (e.g. Ethanol)
☑ 1.0 (e.g. Water)
1.0-1.2 (e.g. Antifreeze)
> 1.2 (e.g. Methylene Chloride)

ASH
< 0.1
0.1 - 1.0
1.1 - 5.0
5.1 - 20.0
> 20
Unknown
Actual:

BTU/LB
☑ < 2,000
2,000-5,000
5,000-10,000
> 10,000
Actual

VAPOR PRESSURE (for liquids only) : mm Hg

D. COMPOSITION (List the complete composition of the waste, include any inert components and /or debris. Ranges for individual components are acceptable. If a trade name is used, please supply an MSDS. Please do not use abbreviations.)

CHEMICAL	MIN - MAX	UOM
BENZENE	0.000 – 139.000	PPB
CARBON TETRACHLORIDE	0.000 – 56.000	PPB
CHLOROFORM	0.000 – 45.000	PPB
ETHYLBENZENE	0.000 – 56.000	PPB
NAPHTHALENE	0.000 – 58.000	PPB
TETRACHLOROETHANE	0.000 – 55.000	PPB
TOLUENE	0.000 – 79.000	PPB
TRICHLOROETHENE	0.000 – 53.000	PPB
WATER	99.000 – 100.000	%
Xylene (Mixed Isomers	0.000 – 319.000	PPB

CHEMICAL	MIN - MAX	UOM
— NO CODE		

ANY METAL OBJECTS PRESENT? YES ☑ NO
If yes include dimension

Clean Harbors Profile No. CH91899B

E. CONSTITUENTS -- Are these values based on testing or knowledge? ☐ Knowledge ☑ Testing

If constituent concentrations are base on analytical testing, analysis must be provided. If based on knowledge, basis of knowledge must be provided below.

RCRA	REGULATED METALS	REGULATORY LEVEL (mg/l)	TCLP mg/l	TOTAL ppm
D004	ARSENIC	5.0		
D005	BARIUM	100.0		
D006	CADMIUM	1.0		
D007	CHROMIUM	5.0		
D008	LEAD	5.0		
D009	MERCURY	0.2		
D010	SELENIUM	1.0		
D011	SILVER	5.0		

RCRA	VOLATILE COMPOUND	REGULATORY LEVEL (mg/l)	TCLP mg/l	TOTAL ppm
D018	BENZENE	0.5		
D019	CARBON TETRACHLORIDE	0.5		
D021	CHLOROBENZENE	100.0		
D022	CHLOROFORM	6.0		
D028	1,2-DICHLOROETHANE	0.5		
D029	1,1-DICHLOROETHYLENE	0.7		
D035	METHYL ETHYL KETONE	200.0		
D039	TETRACHLOROETHYLENE	0.7		
D040	TRICHLOROETHYLENE	0.5		
D043	VINYL CHLORIDE	0.2		

RCRA	SEMI-VOLATILE COMPOUND	REGULATORY LEVEL (mg/l)	TCLP mg/l	TOTAL ppm
D023	o-CRESOL	200.0		
D024	m-CRESOL	200.0		
D025	p-CRESOL	200.0		
D026	CRESOL (TOTAL)	200.0		
D027	1,4-DICHLOROBENZENE	7.5		
D030	2,4-DINITROTOLUENE	0.13		
D032	HEXACHLOROBENZENE	0.13		
D033	HEXACHLOROBUTADIENE	0.5		
D034	HEXACHLOROETHANE	3.0		
D036	NITROBENZENE	2.0		
D037	PENTACHLOROPHENOL	100.0		
D038	PYRIDINE	5.0		
D041	2,4,5-TRICHLOROPHENOL	400.0		
D042	2,4,6-TRICHLOROPHENOL	2.0		

RCRA	PESTICIDES AND HERBICIDE	REGULATORY LEVEL (mg/l)	TCLP mg/l	TOTAL ppm
D012	ENDRIN	0.02		
D013	LINDANE	0.4		
D014	METHOXYCHLOR	10.0		
D015	TOXAPHENE	0.5		
D016	2,4-D	10.0		
D017	2,4,5-TP (SILVEX)	1.0		
D020	CHLORDANE	0.03		
D031	HEPTACHLOR (AND ITS EPOXIDE)	0.008		

OTHER METALS	MIN	MAX	UOM
ALUMINUM			
ANTIMONY			
BERYLLIUM			
CALCIUM			
COPPER			
MAGNESIUM			
MOLYBDENUM			
NICKEL			
POTASSIUM			
SILICON			
SODIUM			
THALLIUM			
TIN			
VANADIUM			
ZINC			

NON-METALS	MIN	MAX	UOM
BROMINE			
CHLORINE			
FLUORINE			
IODINE			
SULFUR			

OTHER NON-METALS	MIN	MAX	UOM
AMMONIA			
REACTIVE SULFIDE			
CYANIDE TOTAL			
CYANIDE AMENABLE			
CYANIDE REACTIVE			

OTHER CHEMICALS	MIN	MAX	UOM
PHENOL			
Total Petroleum Hydrocarbons			

OTHER

HOCs

☐ NONE
☑ < 1000 PPM
☐ >= 1000 PPM

PCBs

☑ NONE
☐ <50 PPM
☐ >= 50 PPM

IF PCBS ARE PRESENT, IS THE WASTE REGULATED BY TSCA 40 CFR 761?

YES ☑ NO

ADDITIONAL HAZARDS

DOES THIS WASTE HAVE ANY UNDISCLOSED HAZARDS OR PRIOR INCIDENTS ASSOCIATED WITH IT, WHICH COULD AFFECT THE WAY IT SHOULD BE HANDLED?

YES ☑ NO (If yes, explain)

ASBESTOS	INFECTIOUS, PATHOGENIC, OR ETIOLOGICAL AGENT	REDUCING AGENT
DEA REGULATED SUBSTANCES	OXIDIZER	SHOCK SENSITIVE
DIOXIN	OSHA REGULATED CARCINOGENS	SPONTANEOUSLY IGNITES WITH AIR
EXPLOSIVE	PESTICIDE	THERMALLY SENSITIVE
HERBICIDE	POLYMERIZABLE	WATER REACTIVE
FUMING / SMOKING WASTE	RADIOACTIVE	
NONE OF THE ABOVE		

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F. REGULATORY STATUS

☑ YES NO USEPA HAZARDOUS WASTE?
F001 F002 F003 F005

YES ☑ NO DO ANY STATE WASTE CODES APPLY?

YES ☑ NO IS THIS WASTE PROHIBITED FROM LAND DISPOSAL WITHOUT FURTHER TREATMENT PER 40 CFR PART 268?
LDR CATEGORY:
VARIANCE INFO:

☑ YES NO IS THIS A WASTEWATER PER 40 CFR PART 268.2?

YES ☑ NO IF ANY WASTE CODES D001, D002, D003 (OTHER THAN REACTIVE CYANIDE OR REACTIVE SULFIDE), D004-D011, D012-D017 NON-WASTEWATERS, OR D018-D043 APPLY, ARE ANY UNDERLYING HAZARDOUS (UHCs) PRESENT ABOVE UNIVERSAL TREATMENT

YES ☑ NO DOES TREATMENT OF THIS WASTE GENERATE A F006 OR F019 SLUDGE?

YES ☑ NO IS THIS WASTE SUBJECT TO CATEGORICAL PRETREATMENT DISCHARGE STANDARDS?
IF YES, SPECIFY POINT SOURCE CATEGORY LISTED IN 40 CFR PART 4

YES ☑ NO IS THIS WASTE REGULATED UNDER THE BENZENE NESHAP RULES? (IS THIS WASTE FROM A CHEMICAL MANUFACTURING, COKE BY-PRODUCT RECOVERY, OR PETROLEUM REFINERY PROCESS?)

YES ☑ NO DOES THIS WASTE CONTAIN VOC'S IN CONCENTRATIONS >=500 PPM?

YES ☑ NO DOES THE WASTE CONTAIN GREATER THAN 20% OF ORGANIC CONSTITUENTS WITH A VAPOR PRESSURE >= .3KPA (.044 PSIA)?

☑ YES NO DOES THIS WASTE CONTAIN AN ORGANIC CONSTITUENT WHICH IN ITS PURE FORM HAS A VAPOR PRESSURE GREATER THAN 77 KPa (11.2PSIA)?

YES ☑ NO IS THIS CERCLA REGULATED (SUPERFUND) WASTE ?

G. D.O.T INFORMATION: (Include proper shipping name, hazard class and ID number).
US D.O.T. DESCRIPTION: *Hazardous waste, liquid, n.o.s., (TRICHLOROETHENE, TETRACHLOROETHENE) , 9, NA3082, PG III*

H. TRANSPORTATION REQUIREMENTS
ESTIMATED SHIPMENT FREQUENCY: ONE TIME WEEKLY MONTHLY QUARTERLY YEARLY ☑ OTHER *VARIES*
IF BULK LIQUID OR BULK SOLID PLEASE INICATE THE EXPECTED NUMBER OF LOADS PER SHIPPING FREQUENCY

CONTAINERIZED	☑ BULK LIQUID	BULK SOLID
CONTAINERS/SHIPMENT	GALLONS/SHIPMENT: GAL.	SHIPMENT UOM: TON YARD
STORAGE CAPACITY:	FROM TANKS: TANK SIZE GAL.	PER SHIPMENT: 0.00 MIN 0.00MAX
CONTAINER TYPE:	FROM DRUMS	STORAGE CAPACI TON/YD
CUBIC YARD BOX	VEHICLE TYPE:	VEHICLE TYPE:
PALLET	VAC TRUCK	DUMP TRAILER
TOTE TANK	☑ TANK TRUCK	ROLL OFF BOX
OTHER:	RAILROAD TANK CAR	INTERMODAL ROLLOFF BOX
DRUM SIZE:	CHECK COMPATIBLE STORAGE MATERIAL	CUSCO/VACTOR
CONTAINER MATERIAL:	☑ STEEL / STAINLESS STEEL	OTHER
STEEL	RUBBER LINED / FIBERGLASS LINED	
FIBER	DERAKANE	
PLASTIC	OTHER	
OTHER		

I. SPECIAL REQUEST
SPECIFIC DISPOSAL RESTRICTIONS OR REQUESTS: *LANDFILL GRASSY MOUNTAIN / MEETS TREATMENT STANDARDS*
SPECIAL WASTE HANDLING REQUIREMENTS
OTHER COMMENTS OR REQUESTS:

J. BIENNIAL / ANNUAL REPORTING INFORMATION
SIC CODE *9711* SOURCE CODE *A63* FORM CODE *B101* ORIGIN CODE *NA*

K. SAMPLE STATUS

	YES	SAMPLED BY	DATE SAMPLED	WHERE SENT
REPRESENTATIVE SAMPLE HAS BEEN SUPPLIE	☑ NO			

GENERATORS CERTIFICATION

I here by certify that all information submitted in this and attached documents is correct to the best of my knowledge. I also certify that any samples submitted are representative of the actual waste. If Clean Harbors discovers a discrepancy during the approval process, Generator grants Clean Harbors the authority to amend the profile, as Clean Harbors deems necessary, to reflect the discrepancy.

AUTHORIZED SIGNATURE	NAME (PRINT)	TITLE	DATE
Merle D Reynolds	Merle D Reynolds	Env Prof Spec	3/9/05

FOR CLEAN HARBORS USE ONLY
CHI REPRESENTATIVE COMPLETING PROFILE:_____

09100212
PFW/08/25/2005

Please print or type. (Form designed for use on elite (12-pitch) typewriter.) Form Approved. OMB No. 2050-0039.

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. UT3213820891 Manifest Document No. PS013 2. Page 1 of 1 Information in the shaded areas is not required by Federal law.

GENERATOR

3. Generator's Name and Mailing Address
Tooele Army Depot
ATTN: Dean Reynolds
Tooele Army Depot Environmental Office, SMTE-, DS-EO Building 6
Tooele, UT 84074
4. Generator's Phone (435) 833-3604

A. State Manifest Document Number
B. State Generator's ID Tooele Army Depot Tooele, UT 84074

5. Transporter 1 Company Name
MP Environmental Services
6. US EPA ID Number UTD980629247
C. State Transporter's ID
D. Transporter's Phone (801) 393-1151

7. Transporter 2 Company Name
8. US EPA ID Number
E. State Transporter's ID
F. Transporter's Phone

9. Designated Facility Name and Site Address
Clean Harbors Grassy Mountain
3 Miles East 7 Miles North of Knolls
Clive, UT, 84029
10. US EPA ID Number UTD981301718
G. State Facility's ID
H. Facility's Phone (801) 323-8666

11. US DOT Description (Including Proper Shipping Name, Hazard Class and ID Number)	HM	12. Containers No.	Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste No.
a. HAZARDOUS WASTE, LIQUID, N.O.S., (TRICHLOROETHENE, TETRACHLOROETHENE), 9, NA3082, PG III	X				T	F001 F002 F003 F005
b.						
c.						
d.						

J. Additional Descriptions for Materials Listed Above
EMERGENCY PHONE TOOELE ARMY DEPOT FIRE DEPT (435) 833-2115

K. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.
If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name [illegible] Signature [illegible] Month 09 Day 20 Year 05

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials
Printed/Typed Name Signature Month Day Year

18. Transporter 2 Acknowledgement of Receipt of Materials
Printed/Typed Name Signature Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.
Printed/Typed Name Signature Month Day Year

I. Mark Francis has the appropriate permits for and has accepted the waste this generator is shipping.

FILE COPY OR STATE COPY

CleanHarbors
ENVIRONMENTAL SERVICES, INC.

Land Disposal Restriction Notification Form

Date: 09 / 14 / 2005

MANIFEST INFORMATION

Generator: Tooele Army Depot
Address: Tooele Army Depot
Tooele, UT 84074
EPA ID#: UT3213820894

Manifest No

Sales Order No: D91022123
Manifest Document No: P5013

LINE ITEM INFORMATION

Line Item:	Page No:	Profile No:	Treatability Group:	LDR Disposal Category:
11a	1	CH91899B	WASTEWATER	2 : This is subject to LDR.

EPA Waste Codes
F001 F002 F003 F005

EPA Waste Subcategory
NONE

LDR Chemical Data

Chemical	Underlying Hazardous Constituents	Constituents of Concern	Contaminants Subject to Treatment
BENZENE	N	Y	N
CHLOROFORM	N	Y	N
ETHYL BENZENE	N	Y	N
TETRACHLOROETHYLENE	N	Y	N
TOLUENE	N	Y	N
TRICHLOROETHYLENE	N	Y	N

Certification

Applies to Manifest Line Items

Pursuant to 40 CFR 268.7(a), I hereby notify that this shipment contains waste restricted under 40 CFR Part 268. **11a**

Waste analysis data, where available, is attached

Signature: Larry McFarland
Print Name: Larry McFarland

Title: Program Manager
Date: 9-20-05